



INTERNATIONAL SPACE
RESEARCH PARK™
DEVELOPMENT STUDY



TARGET MARKET
ASSESSMENT & FORECAST



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in cooperation with Tatum CFO

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INTRODUCTION

Background

The National Aeronautics and Space Administration's (NASA's) Kennedy Space Center (KSC) and the Florida Space Authority (FSA) are partnering to develop an International Space Research Park™ (ISRP) on approximately 400 acres of KSC property. As equity partners in the ISRP, NASA and FSA envision the Park to combine commercial, academic, and government tenants in a collaborative research and technology development environment. The Park is a unique opportunity for KSC and the State of Florida to jointly explore complementary research and development (R&D) objectives, Cape Canaveral Spaceport mission enhancement, public--private partnership opportunities, and space commercialization and development.

As a center for R&D, the Park will bring together a dynamic mix of industry, academia, and government researchers to focus their combined strengths in areas of R&D critical to the long-term success of the Cape Canaveral Spaceport and its partners.

The ISRP is the subject of a 12-month development study begun in May 2001. This Development Study consists of a number of deliverables meant to articulate the Park's goals, development issues, target market, and business and management structure. The companion documents to this *Target Market Assessment and Forecast* are available under separate cover and are:

- *Urban Land Institute Advisory Services Panel Report, Kennedy Space Center, Florida: A Strategy for the International Space Research Park,*
- *Preliminary Park Concept and Development Schedule,*
- *Development Issue Report,*
- *Business Case Analysis, and*
- *Final Report.*

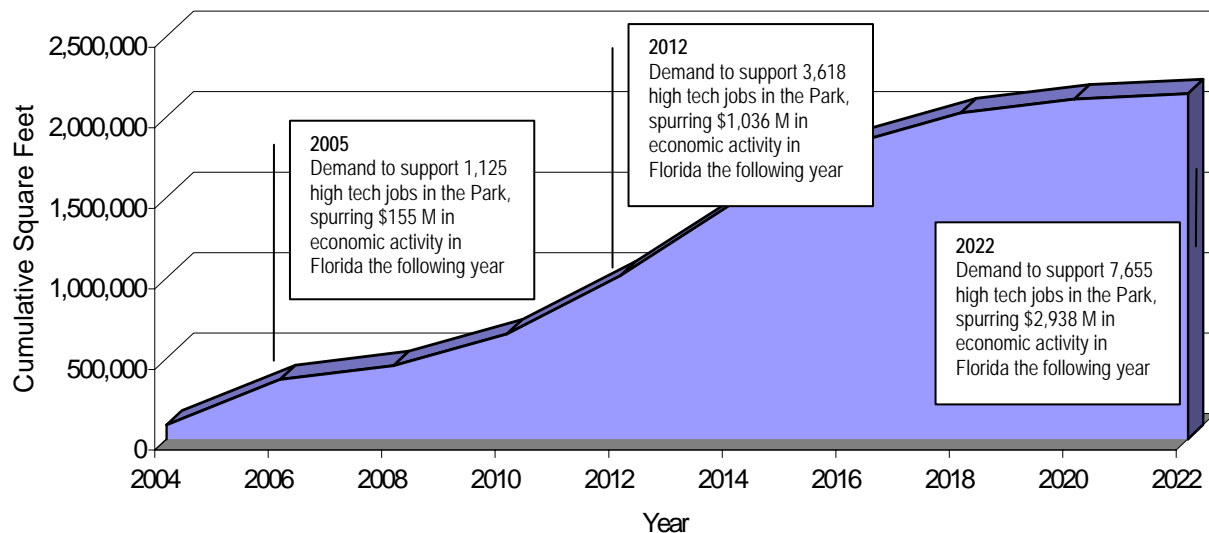
This document, *Target Market Assessment and Forecast*, is a detailed market assessment of the ISRP, based on the target market defined by the partners and refined under this Development Study. The market assessment defines the candidate tenant profile, including requirements of prospective tenants, such as their space requirements and what features may influence their decisions to locate in the Park. This assessment also includes recommendations for competitive positioning of the Park in the regional marketplace. This report provides near-term and long-term **forecasts of the square footage absorption for the Park** and concludes with estimated economic impacts of the Park's development on the local, regional, and statewide economies.

***This document
identifies the
ISRP's potential
market and
forecasts Park
absorption over a
20-year period***

Summary Findings

- The space industry faces a relatively flat forecast amidst national and state environments of general high-tech growth. Brevard County and the Central Florida region reflect these trends. To maximize the Park's potential, ISRP management should **target a diversified tenant base** that represents both the technological strengths of the region and the spaceport mission.
- The competitive position of the ISRP is highly integrated with the economic position and strength of the surrounding community. The ISRP should be **marketed in coordination** with local and regional economic development initiatives.
- Based on interviews with candidate tenants, the ISRP could build out over **300,000 square feet of space** within the first 3 years of Park development, after adjusting for probability of construction.¹
- It is highly reasonable to expect build-out to more than **2 million square feet of R&D-related space** in the ISRP through 2022.
- By 2006, Park operations could create almost \$120 million of annual economic activity for Brevard County and almost \$155 million for the State of Florida.
- At full build-out by 2023, Park operations could generate approximately \$2.3 billion of annual economic activity for Brevard County and \$3.0 billion for the State of Florida.

FIGURE 1: SUMMARY OF ISRP MARKET FORECAST, PARK EMPLOYMENT GENERATION, AND ECONOMIC IMPACT, BASELINE SCENARIO



¹ This estimate assumes that the ISRP is positioned to respond to market demand beginning in 2003; i.e., that land is available for lease and that construction may commence at lessee's will. It also assumes operations begin over the 2004- to 2005 time- frame.

REPORT STRUCTURE & CONTENTS

This report is structured in four major sections:

1. Tenant profile and competitive position of the ISRP;
2. Near-term market assessment;
3. ISRP long-term market forecast; and
4. Economic impact assessment of ISRP.

The tenant profile and competitive position section reports on the characteristics of the ideal ISRP tenant, potential tenant requirements in site selection decisions, and the competitive position and approach the ISRP should pursue to facilitate success. This section reports the results from *Futron's survey of almost 100 companies, educational organizations, and other entities* about their potential interest in establishing a presence at the ISRP. These interviews solicited responses pertaining to requirements for type of space needed and work to be performed, confidence level, anticipated revenues associated with ISRP operations, and perceived advantages and disadvantages of locating in the ISRP.

In the near-term market assessment section, candidate tenant interview responses were combined with assessed confidence levels to produce a *probability-adjusted pipeline for a known ISRP market in the near term*.

The survey's near-term market assessment was combined with a top-down approach to produce a 20-year forecast of ISRP absorption and build-out. This forecast assesses local R&D spending as it relates to national, state, and regional economic trends. The forecast correlates R&D spending with local and regional strengths in select technology sectors and translates this R&D spending growth into square-footage requirements for space. Market capture percentages were applied to these space requirements, and a diffusion model was used to represent the rate of ISRP absorption as market knowledge about the ISRP and its benefits spread. The long-term market forecast presents *pessimistic, baseline, and optimistic forecasts for 20-year ISRP build-out*. Assumptions and methodology are detailed further in the section.

The final report section, on ISRP economic impact, applies the Regional Input-Output Modeling System II (RIMS II) model to *derive the economic impact of the ISRP on the local, regional, and state levels*. The section reports impact in terms of revenues and employment for years 3, 10, and 20 of ISRP operations using the baseline forecast of ISRP market capture. In addition, the analysis reviews the cumulative economic impact anticipated from ISRP infrastructure and construction activity through year 5 of ISRP development.

TENANT PROFILE AND COMPETITIVE POSITION OF THE ISRP

Data Gathering Approach

Futron integrated primary research findings with extensive secondary research to create a balanced profile of potential ISRP tenants and a best-practices approach to attract them. Research park site visits, candidate tenant interviews, literature reviews, and discussions with park management professionals, consultants, and observers of the research park phenomenon provided a consistent perspective on the ideal park environment.

In order to more specifically define the interests and needs of prospective tenants of the ISRP, Futron visited three research parks. One park (Central Florida) was relevant because of its proximity to the ISRP site and the nature of its tenant base. The other two parks were analogous to the ISRP in their origin and affiliation with adjacent federal laboratories. The parks visited were:

- Central Florida Research Park, outside of Orlando, Florida;
- Sandia Science and Technology Park, located adjacent to Sandia National Laboratories in Albuquerque, New Mexico; and
- Cummings Research Park, located adjacent to Redstone Arsenal and NASA Marshall Space Flight Center in Huntsville, Alabama.

**Nearly 70
interviews were
combined with
ISRP
benchmarking
visits and
secondary
research to form
the tenant profile**

During these site visits, Futron interviewed several park management representatives in addition to executives from a total of four tenant organizations.² Futron asked the tenants of these parks their reasons for locating in the park, perceived advantages and disadvantages of the park location, their relationship with the adjacent national laboratory, and what the tenants might change about the park layout, requirements, or management. Park management representatives were asked about the profile of tenants in their parks, the interaction patterns between tenants, and the general relationship of the tenant pool to the adjacent federal facility.

Futron also contacted nearly 100 organizations identified by NASA and the FSA (see Appendix A). Two distinct interview instruments were used. A more-detailed questionnaire was used for companies that have some knowledge about the Park, have already had some discussions with NASA, and have expressed some level of interest in the ISRP (primary list).³ A second, similar set of questions was used for companies that are known to be involved in space-related activities and may have a future interest in the Park (secondary list).⁴ (See Appendices B and C for copies of interview instruments.) Findings from all site-visit interviews and telephone interviews are incorporated in the following sections.

² EMCORE and Team Specialty Products were interviewed at Sandia Science and Technology Park. Dynetics, Inc., and Analytical Services, Inc., were interviewed at Cummings Research Park.

³ 20 primary list interviews were completed.

⁴ 47 secondary list interviews were completed.

To complement the tenant interviews, Futron Corporation also held discussions with staff of the Association of University-Related Research Parks, sought the advice of academics and analysts who study the research park phenomenon almost exclusively, conducted an extensive literature search, and sought to incorporate the development perspectives of the Urban Land Institute advisors to the maximum practical extent.

Positioning the Park for Success

Summary

As the nation's premier space launch and landing facility, Cape Canaveral Spaceport offers opportunities not available elsewhere in the United States and only partially found in the rest of the world. The environment, personnel, and facilities at Cape Canaveral Spaceport combine to make the ISRP a unique location for R&D, technology education, and space business development activities.

The Spaceport is the center of technological activity in Brevard County and remains the premier research and development draw for the region. This constitutes a significant competitive advantage for the ISRP within the context of East Central Florida. Locating at the ISRP means siting at the regional technology hub.

The ISRP is an exceptional offering for East Central Florida. The advantages of the ISRP can be summarized as:

- Unique access and proximity to a quadramodel transport hub, which includes the world's premier spaceport and, for practical purposes, the only payload return site for the International Space Station; and
- Access to world-class facilities and personnel with unique competencies and capabilities through a distinctive relationship with KSC.

Operating in the ISRP environment can offer tenants a distinct advantage in the commercial marketplace. Other nearby office parks provide complementary locations for companies and organizations not fitting the objectives and requirements of the ISRP. The nearest analog to the ISRP opportunity is the Central Florida Research Park, but the draw to that park is distinct from the anticipated draw for the ISRP.

The success of the ISRP can be best facilitated if the ISRP:

- Establishes inclusive criteria that encourage desirable types of activity;
- Pursues a diversified tenant base;
- Targets tenants at the intersection of spaceport capability/expertise and regional technology strength;
- Seeks a high-quality academic presence;
- Encourages high-tech incubator activity at the ISRP;
- Ensures the availability of multi-tenant spec space;
- Integrates ISRP marketing with regional tech marketing activity; and
- Provides a high-level of service to early tenants—future prospective tenants will want to know from these organizations about their experience in the Park.

Economic Context

Aerospace Industry Trends

Kennedy Space Center will continue to be an active center for space launch and related activities over the next 20 years and well beyond. However, several key trends in the aerospace industry—both government and commercial—have a direct impact on the ISRP’s prospects and should influence the Park’s marketing strategy:

- Expanding capabilities of the International Space Station to support research;
- Stagnant government space budgets around the world;
- Flat projections for commercial space launch services;
- A shift away from operational activities within NASA and the Department of Defense; and
- The recognition of a distinct research mission for KSC.

The increasing research capabilities of the International Space Station mean greater requirements for ground-based support, including pre- and post-flight payload processing, concurrent ground-based experimentation, payload engineering support, and other specialized technology services associated with supporting the orbiting laboratory’s R&D requirements. Projections for a seven-member Station crew indicate that ground-based requirements at KSC will outpace even the capabilities and greatly expanded resources that the Space Experiment Research and Processing Laboratory will deliver upon its completion. The ISRP offers a dynamic expansion opportunity for academic, government, and commercial users of the Station.

Despite a flat budget projection for NASA as a whole, recent moves to recognize a distinct research mission for KSC in spaceport technology, coupled with a general NASA trend away from operations and more toward R&D, indicate that science and technology development activities at Cape Canaveral Spaceport should experience at least moderate growth over the Park’s development period. However, neither the commercial nor government sectors are expected to experience any significant growth in space launch requirements over the forecast period. Direct mission-related space activity at the Spaceport will constitute a smaller proportion of the regional and national economies as growth in other high-tech sectors outpaces the aerospace industry. The Florida Chamber of Commerce expects overall aerospace employment in the state to decline during the first decade of the 21st Century.⁵

In recognition of the current environment, KSC and other space centers have begun to focus more externally, searching for opportunities to leverage their relationships with commercial, academic, and other government partners, both in the aerospace industry and in other high-tech sectors. The formation of the ISRP reflects this shift in focus. The aerospace industry represents decades of technological investment that has application across a variety of industries and research areas. Similarly, investment in other industries may fit existing and pending mission requirements for the space sector. The ISRP is an opportunity to encourage this type of cross-fertilization by bringing together R&D interests across a range of industries whose requirements may intersect those of the Spaceport.

⁵ Florida Chamber of Commerce Foundation, *New Cornerstone: Foundations for Florida’s 21st Century Economy*, Tallahassee, FL, 2001.

Related High Tech Clusters

In contrast to the aerospace industry, other high-tech sectors continue to experience significant growth in both Florida and the nation. Some of these sectors are especially resistant to recessionary pressures, and others represent areas of advancement applicable across a broad swath of related industries, including aerospace. The Central Florida region is especially strong in several high-tech clusters that should continue to be bolstered by initiatives, such as Governor Bush's Technology Development Initiative, a proposal for \$100 million dollars to fund three high-tech centers of excellence in Florida universities in fields such as biotechnology, information technology, and simulation (the specific fields and actual centers have yet to be selected). The Central Florida region is also especially strong in several sectors that directly intersect with the technology and mission requirements of space flight. This section highlights the growth potential of several of these sectors.

Related high-tech industries, such as biotechnology, information technology, microelectronics, and energy, are growing more quickly than aerospace and share many technology challenges.

Biotechnology: As an industry, biotechnology has posted robust growth figures, while proving particularly resistant to recessionary pressures. Revenues more than doubled over the 1990s, from \$8 billion in 1993 to \$22.3 billion in 2000, and it remains a healthy industry sector with substantial growth potential.⁶ "Overall, the industry added 12,000 jobs last year, and companies plan to keep hiring through 2002."⁷ The industry has been able to leverage industry collaborations and partnerships for growth. Many small biotech companies are working with larger pharmaceutical companies that have the necessary capital to get their products to market. The government and commercial companies continue to invest billions of dollars each year in biotechnology research and development. National Institutes of Health funding has increased from its 1998 level of \$13.6 billion to a proposed 2003 expenditure of \$27.3 billion.⁸ Generous resources are also being provided by venture capitalists: "Venture capital investors are pouring more money than ever into biotech companies. In the first quarter of 2002, venture capitalists pumped \$854 million into firms around the globe. That's a 53 percent increase over the year-ago period...."⁹

Biotechnology and the aerospace sector have significant overlaps, especially in the areas of human space flight and microgravity research. Biotechnology is critical for the development of closed-loop life support systems for human space travel. There are agricultural crossovers that can benefit farmers and consumers, such as improved seed production, edible vaccines, and the genetic engineering of plants.¹⁰ In addition, protein crystal growth performed in space and microgravity

⁶ "Industry Statistics: 1993-2001," Biotechnology Industry Organization, www.bio.org, downloaded April 8, 2002.

⁷ Clifford, Stephanie, "This Just In: Someone's Actually Hiring," *Business 2.0*, www.business2.com, February 2002, downloaded April 8, 2002.

⁸ "President Fulfills Commitment to Double NIH Funding," *HHS News*, U.S. Department of Health and Human Services, January 26, 2002, downloaded May 6, 2002.

⁹ "Market's Down, But Financing's Up," *Signals Magazine*, www.signalsmag.com, downloaded April 8, 2002.

¹⁰ Biotechnology Industry Organization Web site, www.bio.org, downloaded April 8, 2002.

research are commonly used to study diseases such as diabetes, AIDS, cancer, and influenza. Besides space applications, related growth areas for biotechnology include recent initiatives associated with heightened homeland security concerns. Government dollars are increasing for research on anthrax, small pox, and other bioterrorism threats. Overall, the biotechnology sector is forecast to continue its robust pace of growth through 2010 at the minimum.

In 2001, Florida had 280 medical technologies companies located in the Florida High Tech Corridor, employing 11,000 people and generating \$3.2 billion in annual sales (biotechnology was treated as a subset of medical technologies).¹¹ Throughout the 1990s, the Florida biomedical industry grew faster than the national average, at an annual pace of 4.7 percent.¹²

Information Technology (IT): IT offers solutions for almost all high-tech business sectors, including telecommunications, biotechnology, engineering, energy, and aerospace. IT increases productivity rates in many sectors and contributes substantially to the national output of products and services: “Although IT comprises 8 percent of the U.S. economy as a whole, the IT sector accounted for nearly 30 percent of real growth in Gross Domestic Product (GDP) from 1994 to 2000.”¹³

IT has low operational costs and high financial returns, allowing workers to earn wages well above the national average.¹⁴ Despite the fall of the “dot.coms,” new IT companies continue to spring up and there is a shortage of skilled workers in the field: “As information technology companies are funded, their national growth continues unabated. The information technology and software industry across the country creates 130,000 new jobs each year. Nationwide there are over 340,000 unfilled information technology positions.”¹⁵

Florida already has a large number of IT firms in the state and it is positioned to grow quickly in this sector. “Currently, there are more than 10,000 Florida firms employing more than 200,000 workers in information services software development, computer equipment, telecommunications and Internet applications.”¹⁶ This includes 800 multinational companies with regional offices or headquarters in Florida.¹⁷ Of the 10,000 IT firms located throughout the state, there is a strong concentration of IT within Florida’s High Tech Corridor. As of November 2001, there were 4,000 information technology companies and more than 40,000 information technology employees operating along the Corridor.¹⁸ Florida kept pace with the national growth in IT over the 1990s, maintaining a 5.7 percent average annual rate.

Nanotechnology/Microelectronics: Nanotechnology is a burgeoning field growing out of the increasing miniaturization in certain areas of microelectronics. Like IT, nanotechnology/microelectronics is an enabling technology for other high tech sectors. Miniaturized electronics are an integral component of new medical devices, advances in computing technology, and by

¹¹ Florida High Tech Corridor Council, *Florida High Tech Corridor Annual Report 2000-2001*, www.floridahightech.com, downloaded January 16, 2002.

¹² Florida Chamber of Commerce Foundation.

¹³ “IT and the Economy,” Information Technology Industry Council, www.itic.org, downloaded April 11, 2002.

¹⁴ “IT and the Economy,” Information Technology Industry Council,” www.itic.org, downloaded April 11, 2002.

¹⁵ Florida High Tech Corridor Council, *Florida High Tech 2001, The Guide to Florida’s High Tech Corridor*, www.floridahightech.com, p. 34, downloaded April 11, 2002.

¹⁶ “Information Technology in Florida,” Enterprise Florida, www.eflorida.com, downloaded April 11, 2002.

¹⁷ Ibid.

¹⁸ *Florida High Tech Corridor Annual Report 2000-2001*.

extension, capability growth in the aerospace sector. Nanotechnology has recently gained a great deal of attention, as the government and venture capitalists have invested billions of dollars worldwide over the last several years. In 2000, the U.S. government established the National Nanotechnology Initiative (NNI) to fund basic research and education in the field. The federal budget for NNI has grown over 50 percent, from \$463 million in FY 2001 to \$710 million for FY 2003.¹⁹ One venture capital company invested \$40 million over the past 2 years in 12 start-up nanotechnology and related projects.²⁰ “The US’s National Science Foundation predicts that the total market for nanotech products and services will reach \$1 trillion by 2015.”²¹

The semiconductor industry is the base of the microelectronics cluster. Worldwide, the semiconductor industry alone grew at an average annual pace of 16 percent over the 1990s, with United States more than keeping pace at 17 percent annual growth; this trend is expected to continue through the next decade.²² The Florida High Tech Corridor is home to 275 microelectronic firms that generate combined annual sales of over \$4.5 billion.²³ The University of South Florida finds that these firms are evenly distributed along both the east and west coasts of the Corridor.²⁴

Energy Research: The Central Florida region has a robust and growing activity in energy research and conservation. The Florida Solar Energy Center (FSEC), associated with the University of Central Florida, is recognized by the Department of Energy as a Center of Excellence for hydrogen research and education. FSEC recently received a NASA grant valued at more than \$5.4 million dollars to conduct hydrogen production, storage, and handling research. In addition to its existing aerospace applications, advancements in the field of hydrogen fuel could eventually make hydrogen a manageable, clean-burning alternative to gasoline in motor vehicles. Elsewhere in the state, the University of Florida is receiving an additional \$2.7 million for hydrogen-related research.

The State of Florida also sponsors Energy Investment Initiatives through the Technology Research and Development Authority in Brevard County. The initiatives are designed to assist start-up firms in the field of alternative energy to find and secure investment funding.

¹⁹ “National Nanotechnology Investment in the FY 2003 Budget Request by the President,” National Nanotechnology Initiative, www.nano.gov, downloaded April 8, 2002.

²⁰ Cha, Ariana Eunjung, “Big Potential from Small Things,” Washtech.com, www.washingtonpost.com, March 21, 2002, downloaded March 21, 2002.

²¹ “Societal Implications of Nanoscience and Nanotechnology,” National Science Foundation, March 2001, in “Nanotech, the Tiny Revolution,” *CMP Cientifica*, November 2001, p. 8.

²² Semiconductor Industry Association, www.semiships.org, downloaded May 7, 2002.

²³ The Florida High Tech Corridor Council, *Report on Central Florida’s Technology Clusters*, University of South Florida, Spring 2001.

²⁴ “High Tech for a Super Region,” Tampa Bay Partnership, 2002, downloaded May 5, 2002.

Recommendations

Establish Inclusive Criteria

Other research parks have had the best success with tenant criteria that are inclusive and focus on the *type of activity* permitted in the park versus targeted industries. To be eligible for tenancy in the ISRP, an applicant must meet a minimum of one of the following general guidelines:

1. The proposed use depends on close proximity to the Cape Canaveral Spaceport's facilities (including launch and landing) and/or personnel;
2. The applicant demonstrates a direct relation to the NASA mission and/or to Kennedy Space Center/Cape Canaveral Spaceport strategic objectives;
3. The applicant will engage in R&D activities that integrate academia, industry, and government entities for the advancement of spaceport and range technologies; and/or
4. The proposed use offers a partnering initiative with industry or academia with mutual benefits to NASA, other federal agencies, and the State of Florida.

In addition, the proposed use must be found to predominantly serve one or more of the following functional purposes:

- A. The performance of research or technology development at the ISRP, the Cape Canaveral Spaceport, or in space;
- B. The provision of laboratory or technical support services required by the tenants of the ISRP or the Cape Canaveral Spaceport;
- C. The provision of educational services; including undergraduate, graduate, and post-graduate education in spaceport technology or other scientific and technical disciplines that can be applied to space-related activities, technical training and workforce development, and continuing education for space industry professionals;
- D. The creation of commercial products or services resulting from activities occurring on, near, or directly in support of the International Space Station, the requirements for space experiments and space research/development processing, or the licensing and application of technologies produced for or in collaboration with space-faring organizations (government, industry, or academic);
- E. The development and growth of space-based and space-related commerce; and/or
- F. The provision of medical and wellness services, food services, office support, and convenience services for Park tenants and visitors consistent with location criteria and scope limitations designated in the ISRP master plan.

Consistent with the desired research park environment, a general exclusion should apply to large-scale manufacturing activities and any activity that may pose a threat to the Spaceport, other ISRP tenants, or the wildlife refuge. The above criteria do not preclude activities from any certain industry in its entirety, allowing the ISRP to adapt as the market evolves.

Pursue a Diversified Tenant Base

Unless significant strides are made in launch vehicle technology, the launch business of the Spaceport will experience only marginal growth for the foreseeable future.²⁵ National aerospace budgets are similarly constrained, growing only at or slightly above the pace of inflation.

Over-reliance on funding and activity from the space sector represents a significant risk to the ISRP. Additionally, tenants bring their own contacts, perspectives, and capabilities to the Park from their respective industries.

The more diversified the tenant base, the more robust the combined body of knowledge in the Park will be. The Spaceport, in turn, will have access to a greater range of intellectual capital than it would if the tenants all represented the space industry and presented redundant experiences for reference.

A diversified tenant base is in the best interests of ISRP build-out, the Cape Canaveral Spaceport, and the regional economy. ISRP management should seek a balanced portfolio of tenants, representing diversity in both structure and function. This diversity should include variations across:

- Industry,
- Funding source,
- Size, and
- Management.

This tenant mix represents greater resiliency for the Park as a whole in the face of economic downturns and R&D program changes. In addition to economic stability, such a balance among tenants would encourage dynamic interaction between tenants and would bring new expertise and capability to the Spaceport.

Target Tenants at the Intersection of the Spaceport Mission and Regional High Tech Strengths

The competitive position of the ISRP is highly integrated with the economic position and strength of Brevard County—even Central Florida—as a whole. The ISRP can best achieve its goals of contributing to both the Spaceport’s mission and the intellectual capital of the region if it focuses its attention on building Park activity on existing and burgeoning strengths. The target tenant pool should mirror the high-tech strengths of the region, even while it draws most heavily on the strength nearest the park—aerospace. Towards this end, ISRP management should target as potential tenants those organizations that work in areas of R&D that intersect with the requirements and challenges of both the Spaceport and regional technology clusters.

A diverse tenant base brings economic stability and a more dynamic R&D potential to the ISRP.

²⁵ See Futron Corporation’s *Forecast of Launch Activity at Cape Canaveral Spaceport*, performed for the Florida Space Authority, 2001.

Successful research parks established in the 1990s have been in communities that have distinct strengths in identifiable industry clusters. ISRP management should target organizations in regional tech clusters that are engaged in dual-use technology development or licensing activity. The Florida High Tech Corridor Council tracks the status and health of major high tech sectors in the Central Florida region. These sectors include:

- Aviation and Aerospace;
- Information Technology;
- Microelectronics;
- Modeling, Simulation, and Training; and
- Optics and Photonics.

In addition, KSC offers unique competencies and opportunities to a number of research fields not as well represented commercially in the region. These include:

- Biotechnology,
- Ecological Sciences, and
- Energy Sciences.

The aviation and aerospace cluster is the most obvious candidate group for ISRP tenants. However, the mission and activities of the Spaceport involve areas of research and technology development that are applicable across the industry sectors and research fields noted above. ISRP marketing efforts should *seek out and promote this intersection* in order to diversify the tenant population of the ISRP. This diversification is critical to the long-term health of the ISRP, considering that the aerospace industry's forecast posts only anemic growth for the foreseeable future. However, other industries to which space technology is applicable, such as electronics and information technology, are experiencing robust expansions and should be actively targeted in ISRP marketing efforts.

To help market the Park to this broader target tenant pool, ISRP management should initiative active membership in regional branches of high-tech industry associations. Such affiliations will act as a two-way channel through which the Equity Partners can push out information about the Park while learning more about the needs and capabilities of these potential tenants. Area organizations representing high tech interests include:

- IT Florida (www.ITflorida.com),
- AeA (www.aeanet.org),
- BioFlorida (www.bioflorida.org),
- Florida Aviation & Aerospace Alliance (www.faaa.org),
- Florida Photonics Cluster (www.floridaphotonics.com), and
- Semiconductor Industry Association (www.semichips.org).

Seek a High-Quality Academic Presence

Research park tenants cite access to university researchers and graduating students as key components of their decision to locate in university-related research parks. By attracting a high-quality academic base in the ISRP, the Spaceport would effectively offer a two-punch combination to prospective tenants—the benefits of a university environment and the technical resources and personnel at the Spaceport itself. Moreover, university presence is likely to help ISRP management attract the most desirable R&D tenants, encourage a more collaborative R&D environment in the Park, and facilitate the Park goal of public-private partnerships.

Encourage Incubator Activity and Pursue Start-Ups

A significant portion of innovative activity in industry happens at start-ups, spin-offs, and other small firms. Large firms by necessity have structures and processes that inhibit innovation to some extent. Because of their nature, these small firms are often ideal candidates and beneficiaries of the research park environment. They adapt to new opportunities well, have few barriers to or disincentives for collaborations with outside organizations, and are most often looking to significantly improve on an existing product or introduce a new one to the marketplace, creating a driving need to seek out new technologies and processes.

Experience at other research parks shows that the majority of new tenants come not from relocations, but from indigenous company expansions and start-ups. Spin-off companies, spearheaded by former Sandia Laboratory employees, are a key market for the Sandia Science and Technology Park. At Cummings Research Park in Huntsville, more than 50 percent of the park tenants have corporate headquarters in Alabama. Conversations with university-related research parks revealed the effectiveness of business incubator organizations in generating ideal tenants candidates for their parks. Analysis of research park tenant profiles reveals figures as high as 50 percent of tenants in research parks as area start-ups and spin-offs.

Because ideal tenants are more likely to come in the form of start-ups or spin-offs, ISRP management should focus on encouraging the location of an incubator facility in the Park at the earliest possible stages. The Technology Research Development Authority (TRDA) has already expressed interest in operating a 50,000 square foot facility in the ISRP. ISRP management should coordinate with TRDA or another similar entity to integrate incubator activity with the long-term plans for the Park. The incubator can be a key source of tenants for multi-tenant space in the Park and eventually, as organizations mature, for tenant-owned buildings.

Ensure the Availability of Multi-Tenant Space

The decision to acquire space for company expansion or start-up is a time-critical one. Because of the envisioned role that small companies and start-ups will play in the ISRP, easily adaptable space must be on-hand to ensure that the ISRP is a real option for these target tenants. The availability of multi-tenant space also ensures that Park marketing efforts always have an immediate opportunity for a company looking to expand or relocate. The lack of available building space inventory can effectively shut down the Park marketing effort, and limit the Park only to those organizations that can fund and occupy their own building. ISRP management should coordinate as much as possible the timing of space availability with space needs to ensure maximum market capture.

Integrate ISRP Promotion with Regional Economic Development Efforts

Other parks that have enjoyed success have been highly integrated with regional economic development bodies. The ISRP should be marketed as a component of a dynamic high-tech region. Other regional strengths, such as a skilled labor pool, low cost of living, and a concentration of technology companies, are draws to Brevard County, but not specifically to the ISRP. The ISRP offers unique advantages in the context of the regional environment and can be best marketed in that context. Moreover, the ISRP is a partner in the region's broader effort to improve its position in the state and Nation. By coordinating marketing efforts, the ISRP and county as a whole reach a broader audience and improve their chances of success.

Candidate Tenant Interview Results

Summary

Based on the results gathered through prospective tenant interviews, the level of interest in the ISRP is related to the level of previous knowledge about the Park. Organizations that had not heard of the ISRP prior to the interviews tended to be less interested, while those that had heard of the ISRP tended to be more interested in establishing a presence at the Park at some time in the future.

Thirty-four organizations have already expressed an interest in locating at the Park.

Level of Interest

All respondents were asked if they were interested in establishing a presence in the Park; if they expressed interest, they were asked to estimate their square-footage needs for a Park facility. The primary list respondents were also asked how likely they are to construct and operate a facility and to provide estimates of their annual revenues for the first year of operations. Given their overall lower level of awareness about the Park and the speculative nature of their response, secondary list respondents were not asked to estimate their probability to construct or their annual revenues.

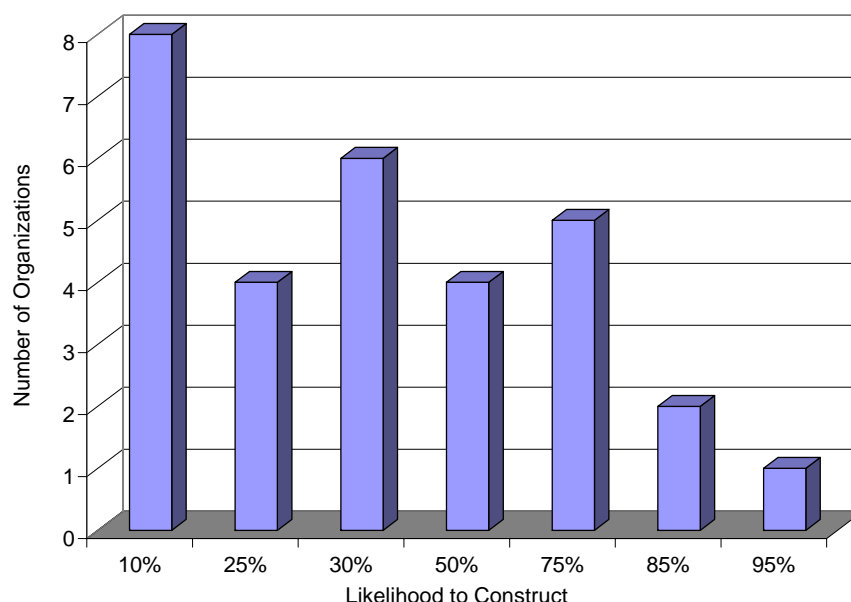
Among the organizations interviewed, about half expressed some interest in establishing a presence in the Park. Organizations with previous knowledge about the Park, or that have already had some discussion with NASA/KSC about building an on-site facility, have a much higher likelihood of constructing and/or operating a facility.

Among the 20 primary organizations that completed interviews, all expressed an interest in the Park. Twelve companies reported a 50 percent or greater likelihood of constructing and operating a facility (8 companies reported a 75 percent or greater likelihood of constructing or operating an on-site facility, while 4 companies reported a 50 percent likelihood). The remaining 8 companies reported a less than 50 percent likelihood of constructing or operating a facility. All of these organizations were able to provide estimates of their square-footage needs.

Secondary organizations, not having had prior discussions with KSC about the ISRP, were asked about possible square-footage needs, but not about their probability of construction, given their lower overall state of decision-making on the subject. Of the 47 secondary organizations that completed interviews, only 14 had at least some interest in establishing a presence at the Park. Ten of the 14 interested organizations (5 commercial entities and 5 Commercial Space Centers) were able to provide estimates of their square-footage needs. The 4 organizations that were not able to estimate their square-footage needs are assumed to be less than 10 percent likely to construct and/or

operate a Park facility within the next 5 years. The 5 commercial companies that were able to report their square-footage needs were assigned a 10 percent likelihood of constructing and operating a Park facility. The Commercial Space Centers are assumed to have a higher likelihood of constructing due to their increased level of knowledge about the Park and their close ties to the NASA/KSC community; however, their consideration about the Park is still in its earliest stages. Therefore, the 5 Commercial Space Centers are assumed to be 30 percent likely to construct and/or operate a facility at the ISRP. Figure 2 shows respondents' reported likelihood to construct facilities in the ISRP. All organizations that provided square footage estimates are included in the figure.

FIGURE 2: RESPONDENTS' REPORTED LIKELIHOOD TO CONSTRUCT ISRP FACILITIES



Interview respondents selected a predominant business area for their potential Park facilities from a list of options. Respondents interested in locating in the Park in years 1 through 3 would engage primarily in commercial research and development activities and would provide space-related educational services. The respondents' research and development activity would focus on spaceport technology services, International Space Station-related services, and microgravity research and life sciences. Interview results showed that the Park would also attract some organizations that offer engineering services and computer-related services. In addition, several of NASA's Commercial Space Centers reported an interest in establishing a presence in the Park, particularly the Space Communications Technology Center, BioServe Space Technologies, the Center for Biophysical Sciences and Engineering, the Commercial Space Center for Engineering, and the Medical Informatics & Technology Applications Consortium.

Organizations that have heard about the ISRP typically fell into one of the following categories:

- Currently work for or with NASA/KSC or FSA;
- Have worked for or with NASA/KSC or FSA in the past; or
- Have former employees of NASA/KSC or FSA.

Many of these organizations were involved in the Space Experiment Research and Processing Laboratory (SERPL) project, and because they have remained informed about other development plans taking place at NASA/KSC, they are now involved in supporting the ISRP effort. Knowledge about the Park has spread among many of these organizations by word of mouth and, in many cases, through casual business relationships or business interactions dealing with issues unrelated to the ISRP.

Several Florida universities were included in this survey through their interest in collaborating on a Park facility with the University of Central Florida. Universities not a part of this envisioned consortium have not been thoroughly polled. Since the Florida university infrastructure represents a prime market segment for the ISRP, such an assessment should be a near-term priority for Park management and the State of Florida. A thorough campaign to educate *all* Florida universities about the Park's potential, followed by an assessment of their interests, should be undertaken. Moreover, this same type of campaign should be taken up with selected out-of-state universities high on the Park target list.

While prior knowledge about the Park increases the level of interest, it does not necessarily ensure interest. There are several organizations that have heard of the ISRP, but are not interested in establishing a presence there for various reasons. Organizations reported the following notable reasons for a lack of interest in or a lack of commitment to establishing a presence at the Park:

- Located as far as 30 miles away from KSC, the amount of work they do for NASA/KSC or FSA does not warrant a need for an on-site presence;
- They recently signed new leases and will not consider moving for at least the next several years;
- They have been at their current locations for many years and are comfortable where they are;
- The cost of moving is not justified by the value of moving to the ISRP;
- They do not need to lease or construct their own space, because they currently use space provided to them by the government; and
- Market conditions and the uncertain status of the space industry over the next few years.

Overall, an established working relationship with NASA/KSC or FSA has a significant influence on the interest level of prospective tenants. Also, networking within the space community is essential for raising the level of knowledge about the Park. Timing is also important as some organizations do not need new space at this time and may reconsider the ISRP when their current leases are close to expiring. Even those companies that have already expressed high level of interest in the Park may have a low probability of actually constructing or operating a facility, because they are dependent on resources from NASA/KSC, the actions of other companies, and market conditions.

Respondents' Site Selection Factors

Key attractors to the ISRP:

- Proximity to customers
- Proximity to the spaceport
- Price of land/space leases

Key detractors from the ISRP:

- Security requirements
- Weak real estate market
- Dependence on government contracts

Key Attractions for Site Selection

Around the country, high-tech companies consistently rank (1) quality of life, (2) access to skilled professionals, and (3) proximity to markets as the top three criteria for business location decisions. The second tier of requirements is skilled labor, low cost of doing business, and access to a university.²⁶ Tenants at other research parks cited proximity to their customer and/or source of innovation (the Park's affiliated laboratory) as the top reason for locating in the parks. The ability of the surrounding community to fulfill other core business needs was also a key consideration for those tenants whose primary customer was external to the Park and affiliated laboratory.

Based on the interviews, ***candidate tenants are primarily attracted to the ISRP for its close proximity to their customers and its close proximity to launch and landing facilities of the Cape Canaveral Spaceport.*** Interview results indicated that close proximity to customers (namely, NASA and KSC) was the number one attribute of importance for organizations interested in the Park, while price was the second most important attribute. Other attributes important to candidate tenants' site selection are easy accessibility, an R&D environment, campus-style environment, and access to a well-educated workforce.

Organizations that are engaged in space work, especially related to the International Space Station, the Shuttle program, or life sciences and microgravity research, are interested in locating as close as possible to scientific research laboratories that are performing similar work to their own, as well as being near the Shuttle launch and landing sites. Proximity to the SERPL allows respondents easy access to information about what types of experiments are taking place and gives them the opportunity to be the first to capitalize on the research being done by NASA and to advance the process of technology transfer.

An R&D environment will encourage cross-fertilization of information and will foster relationship building with NASA/KSC and other Park tenants. Tenant organizations will be able to market their products and services through frequent exposure to government employees, other commercial organizations, and academia at virtually no cost. Candidate tenants may be able to generate additional business with the government and neighboring tenants.

Tenants of other research parks also reported the advantage of "status," or a better image to external customers, by being located at a research park. Current and potential customers view research park tenants as being integral parts of the scientific research and development community. As the ISRP matures, more organizations likely will be attracted to the Park by the desire to be seen as a part of the international space research community.

²⁶ Joel Kotkin and Ross DeVol, *Knowledge-Value Cities in the Digital Age*, Milken Institute, Santa Monica, CA, 2001.

Detractors from Site Selection

Aside from all of the benefits to the ISRP location, there are some factors that tenants view as “showstoppers,” or negative factors that may significantly influence their choice of sites. The main concern of candidate tenants is security requirements. The necessity of badging visitors is viewed as a major inconvenience, and tenants suggested they would greatly prefer to have 24-hour access to their office and laboratory facilities 365 days a year.

A weak local real estate market is also a factor that may prohibit organizations from entering the Park. Respondents expressed an expectation that lease rates on-site are expected to be competitive with the surrounding real estate market.

Candidate tenants reported the most concerns about potential security restrictions limiting their access to Park facilities

Data gathered from visits to other research parks suggest tenants may be willing to pay a premium to be on a research park site, but such a premium is not consistently in place at other parks. Information gathered from visiting other research parks revealed that research park pricing, as related to the surrounding community, varies by location. UCF Research Park management reported that its tenants pay prevailing real estate land costs to purchase research park property. Land costs at the Cummings Research Park are likewise in line with the regional average. However, tenants at the Sandia Science and Technology Park pay about 30 percent more than they would for other nearby sites.

Additionally, many candidate tenants are closely tied to NASA/KSC, and government contracts drive their business. The cancellation of substantial contracts could severely hinder their businesses. The uncertainty of government spending on space-related initiatives in the near and long term appear to make candidate tenants more cautious in their strategic planning and site selections. These candidate tenants are hesitant to move to the ISRP to be closer to a customer whose future spending is uncertain.

Facility Classification

The ISRP is an ideal location for space organizations that are expanding their businesses and need room to grow. Eighteen of the 20 primary organizations that completed interviews described their potential Park facility as a company expansion. Four of the organizations would relocate an existing facility to be closer to NASA/KSC: three from the local area and one from out-of-state.²⁷ One organization is a new company that aims to take advantage of the opportunity to offer new technologies to companies using the Shuttle to transport International Space Station experiments. Tenants that have sufficient space at their current facilities and are located within several miles of NASA/KSC seemed unlikely to relocate to the Park. Therefore, ISRP, for the most part, is not likely to compete with other commerce or industrial parks in the area for existing area tenants.

Timing

Organizations typically cannot foresee their space requirements for more than about 1 to 5 years in the future. The majority (65 percent) of interested prospective tenants that completed interviews anticipate being ready to construct and operate facilities in the Park within 3 years of the Park's

²⁷ Three of the four companies that would relocate also indicated that they would expand their existing business.

operations. All but one of the remaining interested respondents indicated they anticipate beginning operations in the Park within 4 to 6 years. Many companies may need even more time to realize the benefits of the ISRP site location, to obtain funding for new facilities, or to expand their businesses to the point where additional space is necessary. This indicates that significant lead-time is required for tenants between their decision to locate at the Park and their ability to begin operating a facility at the Park.

Terms and Conditions

Candidate tenants are much more interested in leasing buildings or leasing space within buildings than they are in owning their own buildings. Of the total 34 interested interview respondents, 26 (or 76 percent) indicated that they would prefer to lease space; a total of 8 respondents indicated that they would prefer to own a building.²⁸ There was a slight preference on the length of the land or building leases for 1 to 25 years over 26 to 50 years. None of the interviewed organizations indicated an interest in a lease longer than 50 years. On the whole, tenants prefer leases of 25 to 50 years for entire buildings and for less than 25 years for space within buildings.

²⁸ Included in the total of 8 respondents who would prefer to own their own building are three organizations who expressed an intention to team with each other on the requirements and operations of a single facility.

NEAR-TERM MARKET ASSESSMENT

Summary Highlights

The Park is assumed to begin operations in 2003. The near-term market assessment is based solely on the responses of interviews conducted with potential tenants.

- Respondents estimated a need for about 453,000 square feet between 2003 and 2005. When adjusted by the respondents' probabilities of construction, the estimated need for square footage was 315,000 for the same period.
- The space required within the first 3 years of Park operations will be comprised of about 52 percent laboratory space, 37 percent office space, and 11 percent other space (identified as classroom space).
- Respondents estimated annual operational revenues for Park facilities at about \$120 million between 2003 and 2005. When adjusted by the respondents' probabilities of construction, the estimated annual operational revenues for Park facilities were about \$70 million upon achievement of build out to 315,000 square feet.
- The following figure summarizes the results of the tenant interviews:

FIGURE 3: NUMBER OF RESPONDENTS WITH ESTIMATED SQUARE FOOTAGE NEEDS

<i>Organization Type</i>	<i>Number of Completed Interviews</i>	<i>Number of Interviewed Organizations Interested in Park Space</i>	<i>Number of Interested Organizations that Estimated Square Footage Needs</i>
Primary	20	20	20
Secondary	47	14	10

Square Footage

Organizations that were interviewed were asked to estimate the number of square feet they would need if they were to construct a facility in the Park. They were also asked when they would need the space.²⁹ A total of 30 organizations provided estimates of their square-footage needs: 18 organizations responded that they would need space within 1- to 3 years of initial Park operations; 11 responded that they would need space within 4- to 6 years; zero responded that they would need space within 7- to 9 years; and 1 responded that it would need space within 10- to 12 years.³⁰ There were no respondents that reported a need for space beyond 10 to 12 years.

Among the 30 organizations that estimated their square-footage needs, 18 reported a need for a total of 452,900 square feet within the first 3 years of Park operation; 11 reported a need for a total of 171,000 square feet within 4 to 6 years; and 1 reported a need for a total of 90,000 square feet within 10 to 12 years. Figure 4 shows the cumulative square-footage requirements reported by respondents. Based on interview results alone, candidate tenants will require a total of over 700,000

²⁹ Interviewees were given options of 1- to 3 years, 4- to 6 years, 7- to 9 years, 10- to 12 years, 13- to 15 years, or 16- to 20 years.

³⁰ An additional 4 organizations indicated interest in operating a facility in the ISRP between 1 and 3 years of initial Park operations, but those organizations did not estimate square footage.

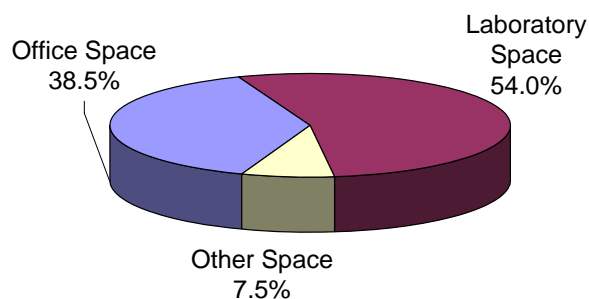
square feet of Park space through the twelfth year of operations. This also does not account for any company expansions that may occur as a result of successful operations at the Park.³¹ These results suggest that organizations that are more certain of their square-footage needs are more likely to construct Park facilities sooner than those that are less certain of their future space needs.

FIGURE 4: INTERVIEW RESPONDENTS' STATED SQUARE FOOTAGE NEEDS

	1-3 Years	4-6 Years	7-9 Years	10-12 Years
Cumulative square feet	452,900	623,900	623,900	713,900
Cumulative companies	18	29	29	30

The interviewed organizations were also asked to estimate how likely they are to construct a facility in the Park based on their current financial situations and strategic plans for the future (regardless of their general level of interest in the Park).³² The organizations' reported square-footage needs were multiplied by their reported likelihood of construction to determine a probability-adjusted estimate of square-footage needs. Figure 5 shows the probability-adjusted square-footage requirements based on the organizations' reported likelihood of constructing Park facilities. Interview results show that within 1 to 3 years of initial Park operations, there is a need for 314,895 square feet of total space and within 10 to 12 years from now, there is a need for a total of 447,845 square feet of Park space. More than half of the required space reportedly will be used for laboratory facilities.

FIGURE 5: INTERVIEW RESPONDENTS' PROBABILITY-ADJUSTED SQUARE FOOTAGE NEEDS, BY TYPE OF SPACE



	1-3 Years	4-6 Years	7-9 Years	10-12 Years
Cumulative office space	116,165	145,465	145,465	172,465
Cumulative laboratory space	164,980	223,630	223,630	241,630
Cumulative other space	33,750	33,750	33,750	33,750
Cumulative total space	314,895	402,845	402,845	447,845

³¹This also does not account for probability adjustments based on respondents' likelihood of construction. Probability-adjusted, cumulative square-footage estimates are for 447,845 square feet of space through the twelfth year of operations.

³² Interviewees were given options of 10, 50, 75, 85, or 95 percent likely to construct Park facilities.

Revenues

Interviewed organizations were asked to estimate annual revenues for their potential Park facilities, selecting from a list of revenue range options beginning with less than \$1 million and increasing in increments of \$10 million with a maximum option of over \$50 million (see Appendix B for exact ranges). Midpoints of the selected ranges were used to calculate the organizations' annual estimated revenues. Candidate tenants that estimated beginning their operations within the first 1 to 3 years of the Park's existence estimated total annual revenues of almost \$120 million for that time period. However, similar to the estimated square-footage adjustments, reported annual revenues were also probability-adjusted by multiplying the annual revenues by the organizations' reported likelihood of construction. Therefore, as shown in Figure 6, the probability-adjusted annual revenues are estimated to be \$72 million for years 1 to 3 of initial Park operations.

For purposes of the near-term market assessment, the organizations' estimated annual revenues are assumed to be constant for each year after operations begin. In other words, the same organizations that estimated a total of \$70 million for years 1 to 3 are assumed to also have annual revenues of \$70 million in 10 to 12 years. In Figure 6 below, the probability-adjusted annual revenues for years 10 to 12 are estimated at over \$110 million. The additional \$40 million is comprised of probability-adjusted annual revenues of the organizations that expect to begin generating revenues between years 4 and 12 of initial Park operations. All, except one, of the interviewed organizations estimated revenues are included within the first 6 years, because they all anticipate beginning operations in the Park in that time frame.

FIGURE 6: INTERVIEW RESPONDENTS' PROBABILITY-ADJUSTED ESTIMATED ANNUAL REVENUES (\$)

	1-3 Years	4-6 Years	7-9 Years	10-12 Years
Cumulative probability-adjusted annual revenues	\$72,055,100	\$103,031,600	\$103,031,600	\$110,781,600

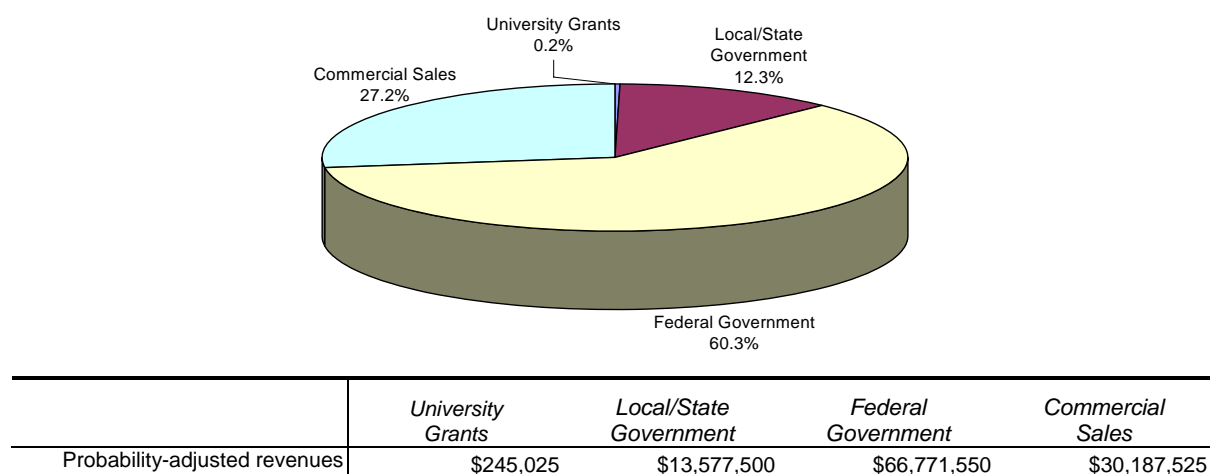
Candidate tenants also estimated the percentage of their revenues that will be obtained from various sources. The distribution of funding sources shown in Figure 7 are based on all of the interview results and include revenue estimates for years 1 through 12 of initial Park operations (33 of the 34 interviewed organizations expect to begin operations within the first 6 years of initial ISRP operations). Interview results suggest that the majority of the revenues are expected to come from the federal government for approximately the first 6 years of operations.

Several of the interview respondents already have working relationships with NASA/KSC that boost their desire to locate a facility in the Park in order to be closer to their customer. These established relationships between NASA/KSC and candidate tenants are important to the early stages of ISRP development. While Figure 7 shows that about 60 percent of the commercial activity in the Park is expected to be federally funded during the first several years of operation, the commercial activity that takes place at NASA/KSC currently is 100 percent federally funded. Therefore, the Park provides NASA/KSC the opportunity to increase commercial funding of space-related activities on site.

On the other hand, tenants likely will receive minimal funding from university grants in the early years, which illustrates the importance of nurturing university-government-commercial networks and attracting more of an academic presence. As the Park matures, tenants are expected to capture

an increasing share of commercial and university resources and to become decreasingly dependent on government spending (this will be discussed further in the top-down market forecast section).

FIGURE 7: INTERVIEW RESPONDENTS' PROBABILITY-ADJUSTED ESTIMATED ANNUAL REVENUES, BY SOURCE OF FUNDS (\$)



As previously mentioned, organizations have relatively short foresight in terms of their infrastructure needs; typical businesses do not plan for space requirements more than about 5 years in the future. Based on the bottom-up analysis alone, it is difficult to estimate square-footage needs for the long-term forecast of ISRP absorption.

LONG-TERM MARKET FORECAST

The business cycle prevents the majority of operations from projecting long-term needs for space and site location requirements. Moreover, since the ISRP exists only in concept, limited market knowledge about the ISRP's existence, along with associated uncertainty as to the costs and advantages of ISRP location, prevent a bottom-up, microeconomic approach to assessing the long-term prospects for ISRP success. The majority of positive responses on the survey came from companies that had prior discussions with NASA and FSA personnel about the ISRP and had near-term (next five years) plans to relocate or expand.

***Brevard County
should experience
healthy R&D
growth over the
next two decades,
creating a
supportive
environment for
Park growth.***

To present the most realistic assessment of the foreseen ISRP market, Futron employed a macroeconomic, top-down approach to forecast the climate for R&D in the ISRP vicinity, merging the long-term forecast with the nearer-term probability-adjusted pipeline to produce a final forecast for ISRP absorption. Futron varied selected assumptions and inputs to produce baseline, pessimistic, and optimistic scenarios.

This forecast addresses the Park's most desirable target market, R&D, and related activities. Other technology services and/or commercial space businesses may express a desire to locate in the ISRP. Based upon its eligibility criteria and individual case circumstances, ISRP management will have to decide whether such cases merit admittance. Considering this auxiliary demand for Park real estate, the actual demand for the ISRP may actually be greater than the target market forecast here.

Summary Results

- **Baseline**
2.1 million square feet by 2022
- **Optimistic**
2.9 million square feet by 2022, or 2 million square feet by 2014
- **Pessimistic**
1.5 million square feet by 2022

With effective Park leadership and highly reasonable improvements in state and regional shares of national R&D expenditures, the ***ISRP can expect to achieve full build-out at reasonable densities over a 20-year time frame.*** After meeting pent-up demand requirements already identified in the previous section, the ISRP's period of most rapid growth should come between 2008 and 2014. This period corresponds with Phase II of ISRP development and the opening up of ISRP property south of Ransom Road for build-out. Under the baseline forecast, the ISRP will absorb more than ***2.1 million square feet*** of R&D and related space.

The optimistic scenario forecasts demand for ISRP space at more than ***2.9 million square feet*** over the next 20 years. This figure most likely represents more demand than the ISRP can accommodate, given technical considerations and restrictions on densities in the Park. Under the optimistic scenario, build-out to 2 million square feet could be expected by 2014.

If Florida and Brevard County move contrary to recent trends and fail to significantly improve the climate for R&D in the state and region, the ISRP could still expect a build-out to **1.5 million square feet**, given effective Park leadership and no substantial setbacks to current R&D programs (e.g., International Space Station cancellation or the removal of a research mission area for KSC).

Approach

Futron used a variety of informational resources to determine the ISRP forecasting approach. For background on research park success factors and market analyses, Futron combined a topical literature review with expert interviews and benchmarking visits to other, analogous research parks.

Consistently, the following aspects arose as determinants of Park success:

- Strong and consistent entrepreneurial Park leadership, including coordination with local and regional economic development organizations;³³
- Strength of technology-related activity in the surrounding area; and
- Access to or /affiliation with a source of intellectual leadership/prestige (laboratory or university).

The first criterion, entrepreneurial leadership, is qualitative and difficult to characterize in a quantitative market forecast. For the ISRP long-term forecast, the effectiveness of the ISRP leadership in capitalizing on opportunity is reflected in the ISRP capture rates for new R&D and related activity.

The second criterion, strength of technology-related activity in the surrounding area, determines the size of the opportunity presented to a research park venture. Over time, the park itself may become part of the intellectual draw of the community, but at the onset and through a significant portion of park development, community characteristics predominate. The surrounding area may present an attractive environment for a variety of reasons, including the presence of a major research university, proximity to a significant national laboratory, and the general density of technology businesses in the area. Regional growth in R&D and associated activities, coupled with a major university or laboratory draw, present a dynamic environment for research park development.

The third criterion is met for the ISRP through the affiliation with KSC and the Spaceport. The ISRP long-term forecast assesses the strength of Brevard County to present the associated R&D growth characteristics and create an opportunity for the Park's maturation and success.

To assess the ISRP's opportunity for success, Futron analyzed historical trends in R&D expenditure patterns and assessed the competitive position of Florida and Brevard County in high-tech industries and R&D capacity. Through discussions with economic development leaders throughout Central Florida, Futron considered the policies and programs in place to attract high-tech activity and bolster R&D capability. Futron then combined trend analysis with forward-looking indices to forecast future performance. Inherent in the forecasts is an assumption of negligible total growth in NASA expenditures in the region, which is consistent with current national policy and spending

³³ Leadership has been found to be the single most important factor surrounding the success of North Carolina's Research Triangle Park. As reported in the unpublished paper by Albert N. Link, "The Growth of Research Triangle Park," unpublished paper, Department of Economics, University of North Carolina at Greensboro, 2002.

patterns. However, in the out-years, a greater proportion of new KSC expenditures are represented as R&D activity, consistent with the evolving KSC mission.

Since this assessment looks at *capturing a share of future R&D increases* in funding, the forecast does not include demand for Park space that might arise because of a transfer of existing R&D programming from another state by the federal government, out-of-state universities, or companies. Should such demand arise, it may supplement or replace the demand forecast here, subject to ISRP management tenant admittance decisions.

Input Parameters & Key Sensitivities

The ISRP's target market is R&D and supporting activities that have a need to access the facilities or personnel of the Spaceport. KSC and FSA would like to see a diversified tenant base that both contributes to and draws from the space missions of NASA, the U.S. Air Force, and the State of Florida. Therefore, in addition to organizations working primarily in the space industry, the ISRP is targeting organizations that seek to apply the knowledge and/or technology resident in spaceport research, development, and operational activities to outside commercial industries. In recognition of this, the ISRP long-term target market forecast addresses high-tech R&D activity in the vicinity of the Park, without restricting such assessment to select industries or funding sectors.

Key quantitative parameters in the top-down assessment are:

- National Gross Domestic Product (GDP) and R&D growth;
- Florida Gross State Product (GSP) and R&D growth (proportional representation);
- Employment patterns in Florida and Brevard County;
- Technology concentration in Florida and Brevard County;
- Brevard County capture of Florida R&D;
- NASA/KSC spending patterns/growth in obligations; and
- The proportion of new NASA/KSC obligations that are R&D related.

The growth rates for GDP, GSP, and national R&D were derived from their historical growth rates over the past decade, as shown in Figure 8. These rates are actually lower than the average annual rate as taken over the past thirty years and represent conservative assumptions for national and state performance. The derivation of Florida and Brevard County R&D performance consider current trends and policy directions and is detailed below.

The forecast is highly sensitive to the ability of Florida to garner a representative share of national R&D expenditures. This sensitivity carries through to the ability of Brevard County to capitalize on the state's success and to act as a partner in the state's efforts to raise Florida's R&D performance.

FIGURE 8: SCENARIO-SPECIFIC ASSUMPTIONS

	<i>Optimistic</i>	<i>Baseline</i>	<i>Pessimistic</i>
Florida R&D as % National R&D by 2022	6.7 % (=GSP/GDP +1%)	5.7% (= GSP/GDP)	4.23 % (<GSP/GDP)
Brevard Technology Concentration Factor (reflects tech density)	2002: 3.25 2022: 4.25	2002: 3.25 2022: 3.88	2002: 3.25 2022: 3.50
KSC R&D Obligations as % Total KSC Obligations	2002: 20 % 2022: 35 %	2002: 20 % 2022: 35 %	2002: 20 % 2022: 20 %
ISRP Capture %, New KSC R&D Obligations	2003: 60 % 2022: 80 %	2003: 40 % 2022: 60 %	2003: 30 % 2022: 50 %
ISRP Capture %, New non-R&D KSC Obligations	2003: 20 % 2022: 40 %	2003: 15 % 2022: 30 %	2003: 15 % 2022: 30 %
ISRP Capture %, non-KSC New R&D Funds	2003: 20 % 2022: 30 %	2003: 20 % 2022: 30 %	2003: 20 % 2022: 30 %

Regional R&D Trends and Initiatives

The State of Florida is taking concrete steps toward increasing the state's attractiveness as a center for R&D and related high tech industries. A recent report by the Florida Chamber of Commerce, *New Cornerstone: Foundations for Florida's 21st Century Economy*, found that the Florida High Tech Corridor Council has had a positive effect on increasing the region's strength in high-tech industries. The report highlights the challenge of continuing to supply the technology-intensive industries with a suitably trained workforce as a key element of future successes.

The East Central Florida region is actively pursuing improvements in technology workforce development. Brevard Community College began offering an aerospace technicians' Associate Degree in Fall 2001. The community college worked with area industry officials to define the requirements and course content for the degree. The National Science Foundation recently provided a workforce training grant to establish a National Aerospace Technical Education Center (SpaceTEC). Brevard Community College, adjacent to KSC, is a lead institution in this effort. The award, initially a \$3 million, 3-year allotment, comes with two 3-year renewal options. At the same time, the University of Central Florida has enhanced its ability to supply the region with skilled, 4-year degreed professionals.³⁴

State initiatives have targeted increasing Florida's R&D infrastructure in recent years. Programs designed to enhance the status of Florida universities have had some success. While Florida ranks 33rd amongst states in total R&D intensity, it ranks 17th in academic R&D intensity, indicating recent investment in university R&D infrastructure that makes it more likely such R&D capability will find its way into the private sector.³⁵ The state as a whole is working to enhance R&D and its communication to industry through efforts such as Governor Bush's recently announced Technology Development Initiative, a proposal for \$100 million dollars to fund three high-tech Centers of Excellence at Florida universities in fields such as biotechnology, information technology, and simulation (although the specific fields and actual centers have yet to be selected). Successes, such as the Florida Solar Energy Center's very recent award of a \$5.4 million dollar

³⁴ Florida Chamber of Commerce.

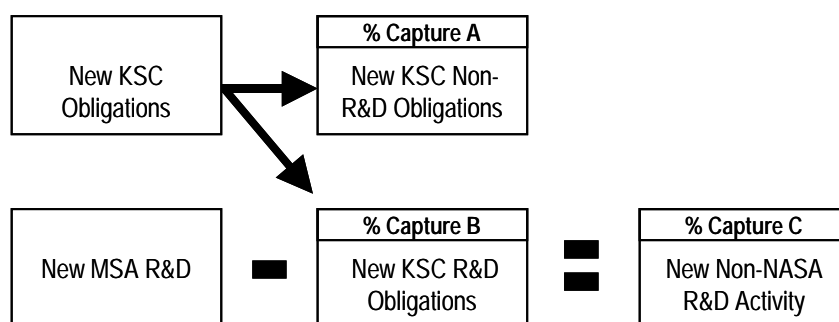
³⁵ Ibid. R&D intensity is defined as dollars of R&D activity divided by the state's GSP. Total R&D intensity considers all R&D activity in the state, while academic R&D intensity considers only R&D performed in educational institutions.

NASA grant to research hydrogen fuel, point to increasing regional R&D strengths. The award is especially notable since the funds come through NASA's Glenn Research Center in Ohio, indicating national recognition of excellence.

Methodology

Keeping in mind the target market of the ISRP, the top-down forecast projects national R&D expenditures through 2022, takes a percentage of those expenditures as happening in Florida, and then estimates the proportion of the state R&D expenditures that will take place in the Melbourne-Titusville-Palm Bay Metropolitan Statistical Area (MSA) (Brevard County). The relationships between the national, state, and MSA R&D figures were derived using a variety of historical and forward-looking indicators, including historical growth rates, proportional trends, technology concentration factors, and national and state policy objectives. The forecast also differentiates between NASA-awarded R&D activity and non-NASA R&D activity.³⁶ KSC extramural R&D activity deemed addressable by the ISRP is forecast as a percentage of NASA and KSC obligations awarded in Florida's District 15 and uses a distinct capture rate that varies by scenario.

FIGURE 9: LONG-TERM MARKET FORECASTING ELEMENTS



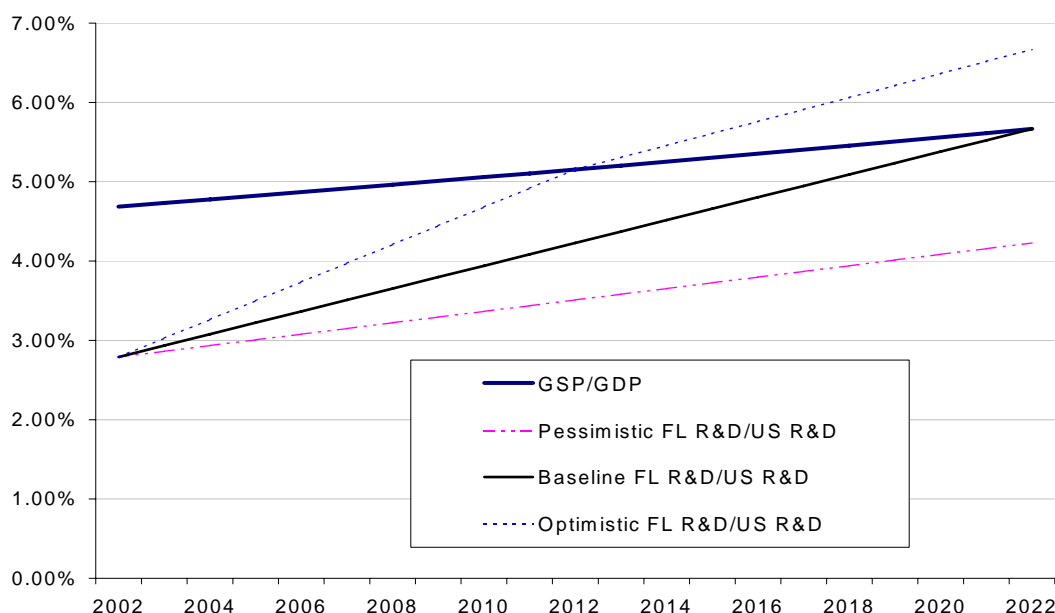
Today, total Florida output, or GSP, represents almost 5 percent of national GDP; in contrast, less than 3 percent of R&D in the United States is performed in Florida. Current political initiatives at both the state and federal levels aim to increase Florida's share of national R&D in proportion to its share of the national economy. Florida proposes to do this not by seeking transfers of programs from other states, but by capturing funding for new federal programs, encouraging indigenous commercial R&D, and strengthening the state commitment to higher education and access to R&D facilities. The KSC-state partnership for the SERPL is evidence of this commitment, along with recent state initiatives, including the activities of Florida's High Tech Corridor and Governor Jeb Bush's recently announced Technology Development Initiative.

The forecast through 2022 presumes some improvement in Florida's R&D performance as a percentage of national R&D, which varies by scenario. See Figures 10 and 11 for an exhibition of Florida's improvement in R&D under the various forecast scenarios. Figure 12 displays Florida's R&D performance in comparison to other states and the national average. In Figure 10, "output" refers to either GSP in the instance of individual states or GDP in the case of the U.S. average; total

³⁶ In the case of NASA R&D, an inclusive definition of R&D was used. NASA-funded R&D includes both basic and applied research, along with technology development activities, up to—but not including—manufacture and operations of a functional, "operational" unit.

R&D is all R&D performed in the state, regardless of funding sector, while federal R&D refers to only that R&D performed in the reference state that was funded by the federal government.

FIGURE 10: FORECASTED RELATIONSHIP BETWEEN FLORIDA R&D, GSP, AND GDP³⁷



	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020	2022
GSP/GDP	4.69%	4.78%	4.87%	4.96%	5.06%	5.15%	5.25%	5.35%	5.45%	5.56%	5.67%
Pessimistic FL R&D/US R&D	2.79%	2.93%	3.08%	3.22%	3.37%	3.51%	3.65%	3.80%	3.94%	4.08%	4.23%
Baseline FL R&D/US R&D	2.79%	3.08%	3.37%	3.65%	3.94%	4.23%	4.52%	4.80%	5.09%	5.38%	5.67%
Optimistic FL R&D/US R&D	2.79%	3.26%	3.74%	4.21%	4.68%	5.15%	5.46%	5.76%	6.06%	6.36%	6.67%

The MSA in which the ISRP resides (Brevard County) is highly technology-concentrated. In fact, Brevard County workers are more than *three times as likely to be employed in tech-related jobs* as workers in the rest of the state.³⁸ The forecast takes the concentration of R&D in Brevard County as proportional to the concentration of tech-related activities, with a slight dampening factor in the near-term to account for the preponderance of operational technology activity at the Spaceport. This is reflected in the “technology concentration factor” referenced in Figure 8. Combining this concentration factor with employment forecasts for the MSA,³⁹ the forecast derives R&D expenditures for Brevard County as a function of county size and tech concentration. Today,

³⁷ GSP/GDP = GSP as a percentage of GDP; FL R&D/U.S. R&D = FL R&D as a percentage of total U.S. R&D.

³⁸ Technology employment statistics taken from:

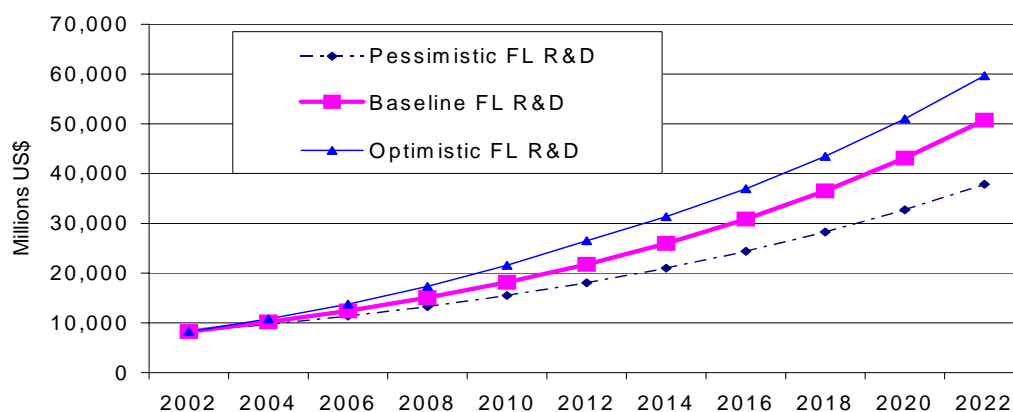
American Electronics Association & NASDAQ, *Cybercities*, Washington, DC, 2000.

American Electronics Association, *Cyberstates 2001: A State-by-State Overview of the High-Technology Industry*, Washington, DC 2001.

³⁹ Bureau of Economic and Business Research, University of Florida, *Florida: Long-term Economic Forecast 2001*, Gainesville, FL, University of Florida, 2001.

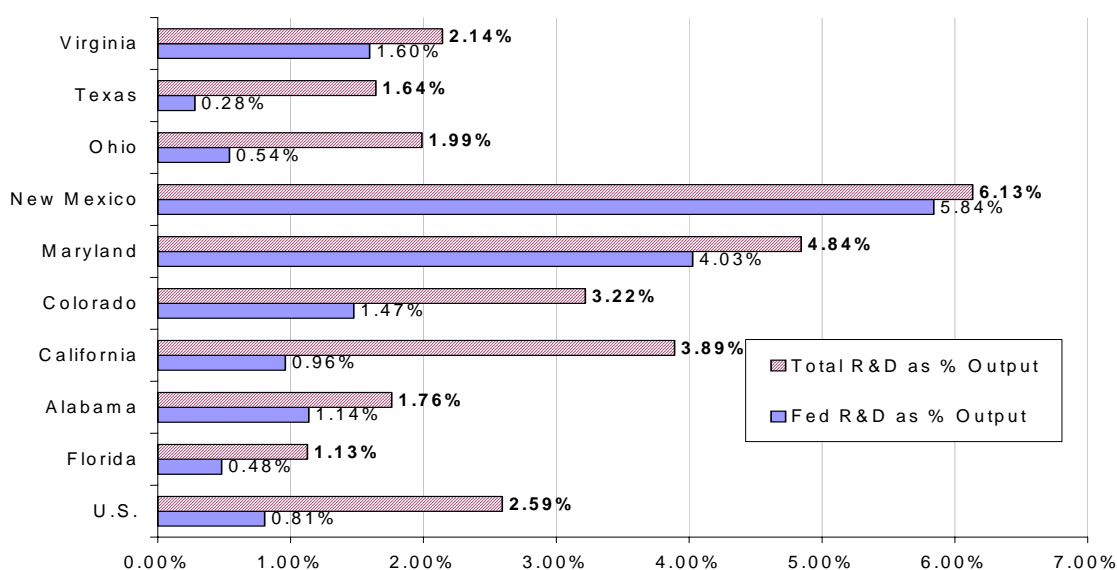
Brevard County represents more than 8 percent of Florida R&D. Recent trends indicate that the county is becoming even more reliant on technology-related activities, increasing its concentration of technology workers over the course of the 1990s.⁴⁰ With a policy shift toward increasing R&D activity at the Spaceport, the forecast predicts Brevard County will increase its share of Florida R&D by 2022, approaching 10 percent of state R&D in the most optimistic scenario.

FIGURE 11: FLORIDA R&D EXPENDITURES, BY SCENARIO



	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020	2022
Pessimistic FL R&D	\$ 8,248	\$ 9,690	\$11,356	\$13,279	\$15,498	\$18,054	\$20,996	\$24,380	\$28,268	\$32,733	\$37,857
Baseline FL R&D	\$ 8,248	\$10,165	\$12,417	\$15,057	\$18,146	\$21,752	\$25,955	\$30,843	\$36,520	\$43,105	\$50,731
Optimistic FL R&D	\$ 8,248	\$10,776	\$13,783	\$17,346	\$21,556	\$26,514	\$31,360	\$36,977	\$43,481	\$51,001	\$59,686

FIGURE 12: COMPARATIVE R&D CONCENTRATIONS, BY STATE, 1998



⁴⁰ American Electronics Association, *Cybercities*.

The forecast takes new R&D dollars in the MSA and converts those dollars to employees using a factor of \$100,000 per employee in the base-year 2002 (the dollars per employee increase proportional to inflation over the forecast period). A factor of 280 square feet per employee is used to convert from new employees to space requirements.⁴¹ These conversion factors are consistent with those used by the Urban Land Institute in its July 2001 assessment of the ISRP's market potential. These figures are also consistent with average dollars per R&D employee found for KSC R&D activity in previous studies,⁴² and the average revenues per square square-footage requirements anticipated by the candidate tenant interview respondents.

All forecasts use current then-year dollars (inflation factor is implicit), and general inflation (national and state levels) is set to a 3 percent annual rate.

Forecasted Absorption/Diffusion Model

Using the above methodology, the ISRP absorption forecast results in a linear projection over time. However, economic behavior suggests that there exists some time lag between market opportunity and market action. In the case of the ISRP, Park growth is likely to lag behind opportunity in the early years while the market is educated about the possibilities of Park location and shown the ensuing advantages afforded to early ISRP adopters. Once such knowledge spreads through the market, either by word of mouth or an assertive marketing campaign, the ISRP adoption rate will accelerate until a certain saturation point is approached.

A technology diffusion model represents an increasing absorption rate for ISRP space as the Park matures.

This behavior mimics the “S”-curve typically associated with new technology products and innovations. In this instance, the product is the ISRP, the saturation point is the physical limit of the Park, and the adopters are candidate tenants that either contribute to or rely on the mission activities of KSC and the Spaceport.

Researchers have shown that the growth of Research Triangle Park in North Carolina conforms to a diffusion model known as a Gompertz curve, a forecast curve typically applied to the growth and dissemination of technologies.⁴³ The Gompertz curve is closely related to the Fisher Pry curve, a more easily manipulated diffusion curve applied here in the case of the ISRP (see Figure 13).

Futron adapted the linear projection over time into an S-curve model using the Fisher Pry curve. The Fisher Pry curve relies on knowing the market saturation point and the time to 50 percent diffusion/adoption. The middle years of Park development represent the period of fastest build-out for the ISRP. For each scenario—pessimistic, baseline, and optimistic—the saturation point was set at the projected demand by 2022 (found from the top-down forecast), and the time to 50 percent

⁴¹ Average revenues/employee and sf/employee statistics taken from:

Urban Land Institute, *Kennedy Space Center, FL: An Advisory Services Panel Report*, Urban Land Institute, Washington, DC 2001.

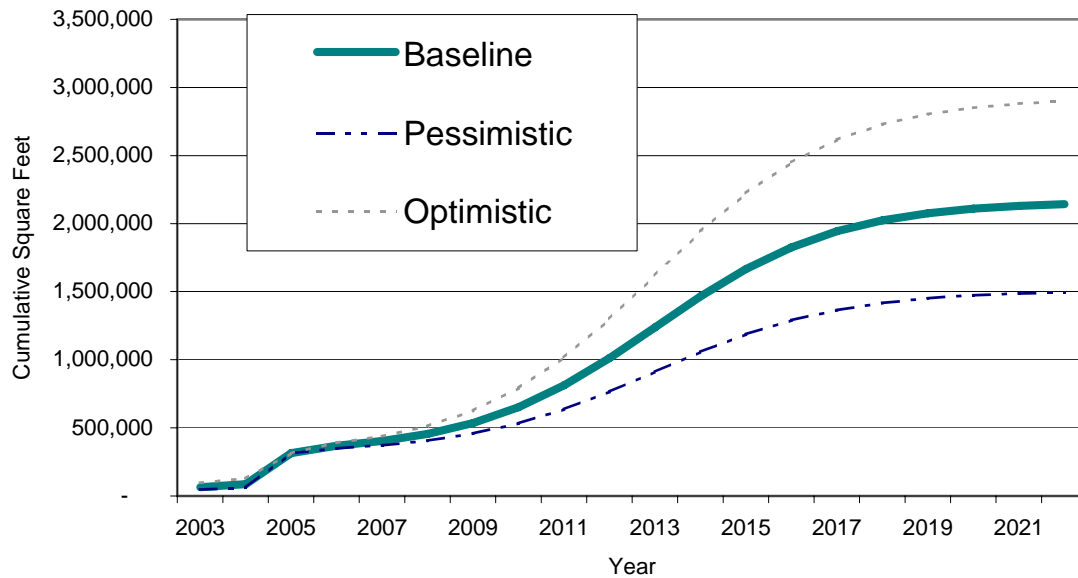
⁴² Futron Corporation, *Cape Canaveral Spaceport Launch and Laboratory Space Requirements Forecast*, August 2001. Delivered under contract to Spaceport Florida Authority.

⁴³ Link.

diffusion/adoption was baselined at year 10 (2012) of ISRP life. In all scenarios, this resulted in slow build-out in the early years of ISRP operations, with an upswing beginning in 2009 and a true differentiation between forecast scenarios emerging. Also in all scenarios, the forecast intersects the probability-adjusted pipeline demand for 2005 assessed through the candidate tenant interview process (314,895 square feet).

The ISRP should experience robust demand under both the optimistic and baseline scenarios. The physical size of the Park site, combined with the requirements for wetland preservation, stormwater management, community open-space, lot-density restrictions, an educational campus, and business services, limits the available square footage for build-out. Therefore, the 2,898,410 square feet forecast in the optimistic scenario likely exceeds the capacity of the ISRP. **The most reasonable accommodation of build-out corresponds with the baseline scenario of 2,143,467 square feet by 2022.**

FIGURE 13: FORECASTED DEMAND FOR ISRP SQUARE FOOTAGE, ALTERNATE SCENARIOS WITH ASSOCIATED EMPLOYMENT PROJECTIONS



	2004	2006	2008	2010	2012	2014	2016	2018	2020	2022
Optimistic ft ²	128,058	391,465	513,053	791,430	1,301,113	1,940,893	2,450,576	2,728,953	2,850,541	2,898,410
Optimistic linear ft ²	202,494	726,945	941,375	1,185,373	1,433,041	1,667,255	1,930,660	2,226,132	2,556,874	2,927,111
Baseline ft ²	87,120	369,090	455,148	652,179	1,012,925	1,465,751	1,826,497	2,023,528	2,109,586	2,143,467
Baseline linear ft ²	133,941	586,993	727,194	884,891	1,042,484	1,218,879	1,416,960	1,638,807	1,886,737	2,163,781
Pessimistic ft ²	63,006	349,856	405,371	532,474	765,189	1,057,304	1,290,018	1,417,121	1,472,637	1,494,493
Pessimistic linear ft ²	98,445	512,394	609,169	716,659	818,155	930,053	1,053,980	1,190,809	1,341,516	1,507,597

	2004	2006	2008	2010	2012	2014	2016	2018	2020	2022
Optimistic employment	457	1,398	1,832	2,827	4,647	6,932	8,752	9,746	10,181	10,351
Optimistic linear employment	723	2,596	3,362	4,233	5,118	5,954	6,895	7,950	9,132	10,454
Baseline employment	311	1,318	1,626	2,329	3,618	5,235	6,523	7,227	7,534	7,655
Baseline linear employment	478	2,096	2,597	3,160	3,723	4,353	5,061	5,853	6,738	7,728
Pessimistic employment	225	1,249	1,448	1,902	2,733	3,776	4,607	5,061	5,259	5,337
Pessimistic linear employment	352	1,830	2,176	2,559	2,922	3,322	3,764	4,253	4,791	5,384

ECONOMIC IMPACT

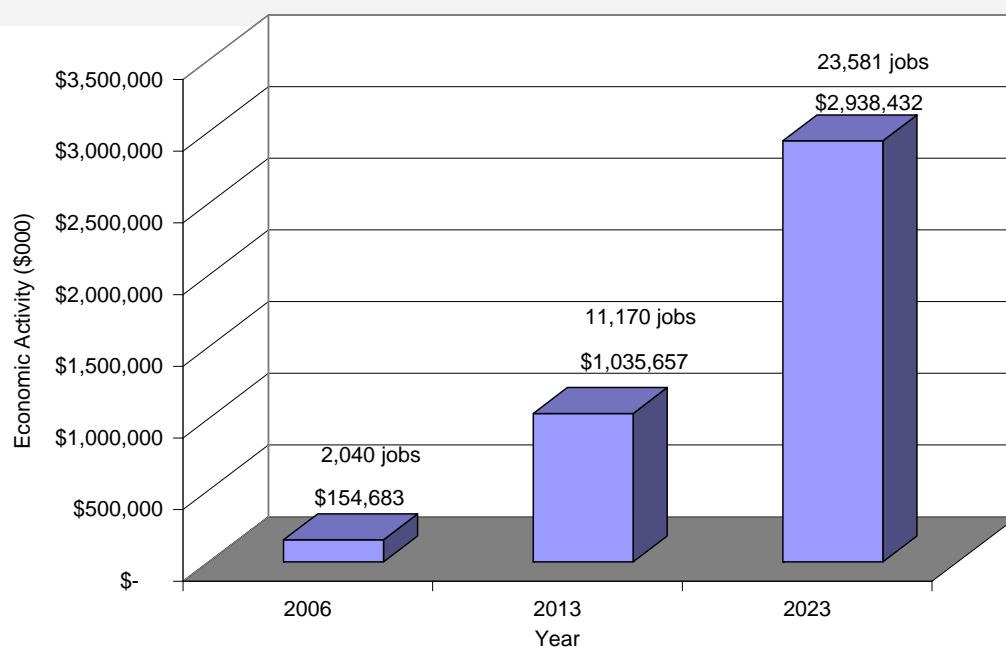
Summary

The ISRP has the potential to impact the State of Florida by realizing about **\$150 million of additional economic activity** and over **2,000 new jobs** in 2006 and by gaining almost **\$3 billion of additional economic activity** and over **23,500 new jobs** in 2023.

The Park is assumed to begin operations in the year 2003. Economic impacts for ISRP operations were calculated for Brevard County, East Central Florida, and the State of Florida for the operating years 2006, 2013, and 2023. All calculations are derived from the square footage absorption rates, employment projections, and ISRP revenues associated with the Baseline forecast scenario. However, organizations are assumed to have a 1-year lag time between demand for a Park facility and the beginning of Park operations. One year represents a likely average between organizations needing to construct their own facilities and organizations moving into multi-tenant buildings. Therefore, the annual economic impact from Park operations in 2006 is based upon operations resulting from the realization of demand through 2005, and likewise for subsequent years. The 3-year impacts are based on the probability-adjusted annual revenues gathered through candidate tenant interviews. The 10- and 20-year impacts are based on the baseline revenue capture estimates from the top-down market assessment for years 2012 and 2022. All economic impact figures represent current then-year dollars (escalated for inflation at an annual rate of 3 percent).

The total estimated economic impacts on economic activity and jobs created by business activities at the ISRP for the State of Florida are summarized in Figure 14. Assuming the 1-year lag time, snapshots of the impacts are shown for 3, 10, and 20 years.

FIGURE 14: ESTIMATED IMPACTS OF THE ISRP ON ECONOMIC ACTIVITY AND JOBS FOR THE STATE OF FLORIDA, BY YEAR OF REALIZATION



Methodology

Futron used the Regional Input-Output Modeling System II (RIMS II) developed by the U.S. Department of Commerce Bureau of Economic Analysis to calculate the anticipated economic impacts of the ISRP. RIMS II tracks the regional flow of goods and services to determine the interconnection of producers and consumers, and it measures individual industries' contributions to regional economies. Economic impacts reported in this section refer to the goods and services produced by industry groups, including computer and data processing services; engineering, architectural, and surveying services; research, development, and testing services; university education and technical training; and all of the other industry groups that are affected by those industries. All of the input-output (I-O) codes used in the RIMS II model are mapped to multiple standard industry classification (SIC) codes.

The Economic Impact Assessment uses the Department of Commerce's Regional Input-Output Modeling System II.

Appendix D displays the multipliers used to calculate the potential economic impacts of the ISRP. The multipliers used in this study were associated with high value-added activities (as anticipated for the high-tech activity at the Park). These multipliers tend to be higher than multipliers associated with industries lower in technology concentration or use of intellectual capital. All economic impacts were calculated for the regional economies of the State of Florida, East Central Florida, and Brevard County.⁴⁴

For the market assessment, the same proportion of revenues generated by the four operations sectors (computer-related services, engineering services, R&D, and education) was maintained over time. The proportion was determined by the results of interviews with candidate tenants who reported their anticipated predominant business activity of a park facility. Therefore, the weight of each activity sector remains constant for each year the economic impacts were estimated. In addition, a 3 percent annual inflation rate was assumed. Finally, because RIMS II is a static model, the same multipliers were used for each year the economic impacts were estimated. The changes in economic impacts are due solely to increases in estimated annual revenues over time (based on the long-term market assessment).

Economic impacts are measured in terms of economic activity (revenues), earnings, and jobs, as defined below. Cumulative 5-year impacts were calculated for construction of the Park, and 3-, 10-, and 20-years impacts were calculated for operations of the Park.

Economic activity is the dollar value of goods and services produced in an economy. Each additional dollar delivered to final demand for a good or service generates a dollar change in output for all of the input industries required to produce the final good or service.

Earnings are the sum of all the wages and salaries (including employee benefits) paid to employees in an economy. Each additional dollar delivered to final demand for a good or service generates a dollar change in earnings for all employees of the input industries required to produce the final good or service.

⁴⁴ For purposes of the economic impact analysis, the "East Central Florida" region includes Brevard, Orange, Osceola, Seminole, and Volusia Counties.

Jobs refer to the number of workers employed to produce goods and services in an economy.

Park Construction

Estimates of the economic impacts of construction of the Park are based on a sum of all forecasted investments in ISRP-related highways, streets, utilities infrastructure (including water, sewer, pipeline, communications, and power lines), and office and laboratory facilities for the years 2003 through 2007. All of the economic activity, earnings, and employment impacts are not necessarily sustained at a constant rate for each year, nor are they indicative of future impacts that may occur beyond the 5-year period. Cumulative 5-year construction costs were estimated as follows⁴⁵:

- Highways and streets: \$1,127,250
- Utilities infrastructure: \$789,075
- Office, lab, education buildings: \$42,564,578

The top-down market assessment forecasts a need for a total of about 402,580 square feet of office and lab space in 2007. The office to lab space ratio was based on that found in interview results for years 1 to 5 (36% office space and 64% lab space and classrooms). Office space was estimated to cost \$93.75 per square foot and lab space was estimated to cost \$112.50 per square foot to construct.⁴⁶

Park Operations

Futron used probability-adjusted annual revenues estimated by candidate tenants to measure economic impacts for the year 2006. The revenues were distributed among industry groups (computer-related services; engineering services; research, development and testing services; and education and technical training) that the interviewed organizations identified as their predominant area of business for a Park facility. Each industry group has a corresponding SIC code, and each SIC code has corresponding I-O codes specific to the RIMS II model. Each I-O code has regional multipliers. Economic activity, earnings, and jobs impacts were calculated by multiplying revenues by their appropriate regional multipliers for each industry group.⁴⁷ Organizations that are considering relocating Brevard County facilities to the Park were not included in the impact assessment. For the 2006 impacts, estimated revenues were only used for organizations that anticipated beginning their operations within 3 years of the Park beginning operations (or by the end of 2005).

In order to calculate the economic impacts of the ISRP for 10 and 20 years after inception of the Park, Futron converted the top-down market forecast for square-footage absorption to current-year annual revenues.⁴⁸ The revenues were distributed across industry sectors based on the proportions calculated from interview results shown in Figure 15.

⁴⁵ Based on the results of the *ISRP Business Case*.

⁴⁶ For the economic impact analysis of construction, classroom space was considered the same as laboratory space

⁴⁷ Regional impacts should not be added together.

⁴⁸ Based on conversion factors found in *Kennedy Space Center, FL: An Advisory Services Panel Report*, Urban Land Institute, Washington, DC, 2001, and an assumed annual inflation rate of 3 percent.

FIGURE 15: DISTRIBUTION OF ESTIMATED ANNUAL REVENUES, BY INDUSTRY SECTOR⁴⁹

<i>Industry Sector</i>	<i>Percent of total estimated annual revenues</i>
Computer and data processing services	2%
Engineering, architectural, and surveying services	15%
Research, development, & and testing services	72%
University education and technical training	12%

Results

Construction

Brevard County, East Central Florida, and the State of Florida will all generate additional economic activity and new jobs as a result of building the ISRP. As shown in Figure 16, through year five of park build-out, construction of roads, utilities infrastructure, and building space could bring about \$70 million of additional economic activity for Brevard County and a total of about \$90 million of economic activity for the State of Florida. ISRP-related construction will also create nearly 700 new jobs for Brevard County and more than 900 total new jobs for the State of Florida. Based on the total impacts shown below, Brevard County will realize the greatest share of the benefits from construction of the park. Impacts resulting from the demand for construction of the park will create jobs for construction and related industries. However, this does not imply that these jobs will necessarily be sustained beyond completion of park construction activity that occurs within the stated 5 years.

FIGURE 16: CUMULATIVE 5-YEAR ECONOMIC IMPACT OF ISRP-RELATED CONSTRUCTION (2003-2007)

	<i>Economic Activity (\$000)</i>	<i>Earnings (\$000)</i>	<i>Employment (Jobs)</i>
Brevard County	\$70,216	\$22,005	688
East Central Region	\$87,113	\$26,907	835
State of Florida	\$92,749	\$29,818	925

Operations

Figures 17, 18, and 19 display the economic impacts generated by the ISRP in 2006 on the Brevard County, East Central Florida, and State of Florida regions. Economic activity, earnings, and jobs are broken out by the industry groups that initiate the impacts. The demand for the final goods and services offered by ISRP tenants will generate about \$119 million of additional economic activity and about 1,500 new jobs in Brevard County in 2006. For the East Central Florida region, Park activity will generate \$150 million of economic activity and the Park will create \$154 million of economic activity for the State of Florida. Brevard County will capture a large share of the impacts on the State of Florida region created by the Park. Research and development industries will produce about half of the economic activity, earnings, and jobs impacts for all regions in 2006, followed by engineering services and then university education and technical training. Economic impacts induced by the demand for computer services are forecasted to begin in 2006 (therefore, impacts would be realized beginning in 2007).

⁴⁹ Based on tenant interviews.

FIGURE 17: ECONOMIC IMPACTS GENERATED BY ISRP ON THE BREVARD COUNTY ECONOMY, 2006

<i>Industry</i>	<i>Economic Activity (\$000)</i>	<i>Earnings (\$000)</i>	<i>Employment (Jobs)</i>
Computer and data processing services	-	-	-
Engineering, architectural, and surveying services	\$24,267	\$9,412	262
Research, development, & and testing services	\$73,258	\$29,109	1,018
University education and technical training	\$21,234	\$7,548	310
Total Impact	\$118,759	\$46,069	1,589

FIGURE 18: ECONOMIC IMPACTS GENERATED BY ISRP ON THE EAST CENTRAL FLORIDA REGION ECONOMY, 2006

<i>Industry</i>	<i>Economic Activity (\$000)</i>	<i>Earnings (\$000)</i>	<i>Employment (Jobs)</i>
Computer and data processing services	-	-	-
Engineering, architectural, and surveying services	\$30,878	\$11,890	337
Research, development, & and testing services	\$91,795	\$36,053	1,240
University education and technical training	\$26,696	\$9,147	361
Total Impact	\$149,369	\$57,091	1,938

FIGURE 19: ECONOMIC IMPACTS GENERATED BY ISRP ON THE FLORIDA ECONOMY, 2006

<i>Industry</i>	<i>Economic Activity (\$000)</i>	<i>Earnings (\$000)</i>	<i>Employment (Jobs)</i>
Computer and data processing services	-	-	-
Engineering, architectural, and surveying services	\$32,366	\$12,637	361
Research, development, & and testing services	\$94,751	\$37,666	1,298
University education and technical training	\$27,566	\$9,670	382
Total Impact	\$154,683	\$59,973	2,040

The following figures show the total 10- and 20-year economic impacts for all industry sectors combined for each region. Results indicate that the Park could generate nearly \$800 million for Brevard County in 2013 and create over 8,000 new jobs. By 2023, the Park business activity is estimated to induce over \$2 billion of output and about 18,000 jobs in Brevard County. In 2006, 2013, and 2023, the total impacts on economic activity, earnings, and jobs for Florida are about 30 percent greater than the impacts on Brevard County.

FIGURE 20: TOTAL ECONOMIC IMPACTS GENERATED BY ISRP, 2013

<i>Region</i>	<i>Economic Activity (\$000)</i>	<i>Earnings (\$000)</i>	<i>Employment (Jobs)</i>
Brevard County	\$ 797,100	\$311,506	8,715
East Central Florida Region	\$1,001,322	\$385,742	10,627
State of Florida	\$1,035,657	\$404,477	11,170

FIGURE 21: TOTAL ECONOMIC IMPACTS GENERATED BY ISRP, 2023

<i>Region</i>	<i>Economic Activity (\$000)</i>	<i>Earnings (\$000)</i>	<i>Employment (Jobs)</i>
Brevard County	\$ 2,261,582	\$883,826	18,398
East Central Florida Region	\$ 2,841,013	\$1,094,453	22,435
State of Florida	\$ 2,938,432	\$1,147,608	23,581

Based on these results, Futron concludes that Brevard County will benefit from a majority share of the total economic impacts caused by the park. At the same time, the East Central Florida and State of Florida regions will also gain substantial additional economic activity, increased earnings, and new jobs as a direct result of increased business at the ISRP.

APPENDIX A: CANDIDATE TENANTS CONTACTED FOR INTERVIEWS

Accudyne Corp. Palm Bay, FL	Center for Advanced Microgravity Materials Processing Northeastern University, Boston, MA
Aerojet Cape Canaveral, FL	Center for Biophysical Sciences and Engineering University of Alabama, Birmingham, AL
Air Liquide America Corp. Merritt Island, FL	Center for Commercial Applications of Combustion in Space Colorado School of Mines, Golden, CO
Air Force Research Lab Albuquerque, NM	Center for Satellite and Hybrid Communication Networks University of Maryland, College Park, MD
Air Products & Chemicals, Inc. Pace, FL	Center for Space Automation and Robotics University of Wisconsin, Madison, WI
AJT & Associates, Inc. Cape Canaveral, FL	Center for Space Power Texas A&M University College Station, TX
Allied Signal Technical Services Corp. Kennedy Space Center, FL	Center for Space Power and Advanced Electronics Auburn University, Auburn, AL
Applied Research Laboratories Hialeah, FL	Centre National d'Etudes Spatiales Paris, France
Astrocourier Los Angeles, CA	Coleman Aerospace Orlando, FL
Astronaut Memorial Foundation Kennedy Space Center, FL	Command and Control Technologies Corp. Titusville, Florida
Bell Technologies, Inc. Orlando, FL	Command Technologies Satellite Beach, FL
Bionetics Corp. Kennedy Space Center, FL	Commercial Space Center for Engineering Texas A&M University College Station, TX
BioServe Space Technologies University of Colorado Boulder, CO	Comprehensive Health Services Cape Canaveral, FL
Boeing Kennedy Space Center, FL	Computer Science Innovations (CSI) Melbourne, FL
Brevard Community College Cocoa, FL	
California Linear Devices, Inc. Cocoa, FL	
Canadian Space Agency Saint-Hubert, Quebec	

Computer Sciences Raytheon Patrick Air Force Base, FL	Hamilton Sunstrand Space Systems International Windsor Locks, CT
Concurrent Technologies Corp. Largo, FL	Harris Corp. Palm Bay, FL
Consortium for Materials Development in Space University of Alabama, Huntsville, AL	Honeywell Space Systems Clearwater, FL
Cryogenics for Industry Corp. Largo, FL	Instrumentation Technology Associates, Inc. Exon, PA
Cyrospace Technologies Houston, TX	International Space University Strasbourg, France
Dynacs Engineering Co. Kennedy Space Center, FL	Italian Space Agency Rome, Italy
Dynamac Corp. Kennedy Space Center, FL	Japan Manned Space Systems Corp. Tokyo, Japan
Eclipse International Corp. Ontario, Canada	L-3 Communications / Microdyne Corp. Ocala, FL
Environment Systems Commercial Space Technology Center University of Florida, Gainesville, FL	Medical Informatics & Technology Applications Consortium Virginia Commonwealth University, Richmond, VA
European Space Agency Paris, France	Mitsubishi Corp. Huntsville, AL
Florida Solar Energy Center Cocoa, FL	National Space Development Agency of Japan Tokyo, Japan
Florida Space Institute Kennedy Space Center, FL	Norsk Hydro Livonia, MI
Florida Space Research Institute Kennedy Space Center, FL	Northrup Grumman Corp. Melbourne, FL
Food Technology Commercial Space Center Iowa State University, Ames, Iowa	OHB System GmbH Bremen, Germany
GeoTech Chemical Company Tallmadge, OH	Pratt & Whitney West Palm Beach, FL
German Aerospace Center Cologne, Germany	Precision Fabricating and Cleaning Cocoa, Florida
Global Atmospherics, Inc. Tucson, AZ	Primex Aerospace Company St. Petersburg, FL

ProVision Technologies Stennis Space Center, MS	SPACEHAB, Inc. Houston, TX
Research Triangle Institute Cocoa Beach, FL	Sverdrup Technology Cape Canaveral, FL
Reynolds, Smith & Hills, Inc. Merritt Island, FL	SVT Consultants Nedlands, Australia
RWD Technologies, Inc. Merritt Island, FL	Technology Research Development Agency Titusville, FL
Science Applications International Corp., Space Coast Operations Melbourne, FL	The Aerospace Engineering Group of IDEA, LLC Ellicott City, MD
Scientific Instruments West Palm Beach, FL	Thiokol Propulsion Kennedy Space Center, FL
Scottish Development International Orlando, FL	TRW Space and Electronics Cape Canaveral, FL
Sensidyne, Inc. Clearwater, FL	UE Systems, Inc. Elmsford, NY
Signal Technology-Keltec Fort Walton Beach, FL	United Space Alliance Cape Canaveral, FL
Solidification Design Center Auburn University, Auburn, AL	University of Central Florida Titusville, FL
Space Communications Technology Center Florida Atlantic University, Boca Raton, FL	University of Florida Gainesville, FL
Space Flight Unlimited Cape Canaveral, FL	University of Miami Miami, FL
Space Ground Systems Solutions Melbourne, FL	University of South Florida Tampa, FL
Space Machine & Engineering Corp. St. Petersburg, FL	University Space Research Association Columbia, MD
Space Science Services, Inc. Orlando, FL	Wyle Labs Cape Canaveral, FL
Space Vacuum Epitaxy Houston, TX	

APPENDIX B: INTERVIEW FORM FOR CANDIDATE TENANTS FAMILIAR WITH THE ISRP

INTERVIEW QUESTIONS FOR POTENTIAL TENANTS OF THE *INTERNATIONAL SPACE RESEARCH PARK*

Company _____
Interviewee name _____ Title _____
Address _____
Phone number _____ Email _____
Date of interview _____ Interviewer _____

Hi, this is xxxxx at Futron Corporation in Bethesda, MD. We are working with the NASA Kennedy Space Center to determine the current level of interest in a proposed International Space Research Park and to assess the needs of potential tenants. We are conducting telephone interviews of organizations that have already expressed interest in operating a facility at the Research Park AS WELL AS organizations that we believe may have a future interest in the Research Park.

We got your name and phone number from our client at the NASA Kennedy Space Center and understand that you have expressed interest in the Research Park. Do you have a few minutes to answer some questions about your organization and your potential interest in the proposed Research Park?

Yes (Continue with questions below)

No (Is there a more convenient time that I could call you back? *Date Time*)

Change of contact (Who is a more appropriate person to talk to?)

Name

Phone number

1. How did you hear about the International Space Research Park?
2. What attracted your organization to the possibility of establishing a presence at the Park?
3. Which one of the following best describes the predominant business that your organization will perform at the potential Park facility?
 - ☐ Research, development, and testing services
 - ☐ Engineering, architectural, and surveying services
 - ☐ Computer programming, data processing, and other computer-related services

- ☐ Non-commercial research
 - ☐ College, university, professional or technical education
4. Considering your organization's current financial status and strategic plans for the future, which of the following best describes how likely your organization is to construct and/or operate a facility in the Park?
- ☐ 10% likely
 - ☐ 50% likely
 - ☐ 75% likely
 - ☐ 85% likely
 - ☐ 95% likely
5. What other site locations, if any, is your organization considering at this time?
- _____
6. When does your organization anticipate beginning operation of a facility in the Park?
- ☐ 1-3 years ☐ 4-6 years ☐ 7-9 years ☐ 10-12 years ☐ 13-15 years ☐ 16-20 years
7. Which of the following best describes your organization's potential Park facility?
- ☐ Start-up company
 - ☐ New company (in business for 5 years or less)
 - ☐ Company expansion
 - ☐ Re-location of an existing facility
- Re-location from where? (Provide city and state of existing facility)
- _____
8. What type of facility would your organization operate at the Park?
- ☐ Office ☐ Laboratory ☐ Office and Laboratory ☐ Other (specify _____)
9. Please estimate the number of square feet required for the potential Park facility.
- _____ square feet office space _____ square feet lab space
- _____ square feet other space
10. Which of the following do you anticipate that your organization would be interested in?

- ☐ Owning a building ☐ Leasing a building ☐ Leasing space within a building

GO TO QUESTION 11 OR 12 DEPENDING ON RESPONSE TO QUESTION 10

11. How many years would your organization prefer to lease land or lease a building at the International Space Research Park?

- ☐ 1-25 years ☐ 26-50 years ☐ More than 50 years (Specify _____)

12. How many years would your organization prefer to lease space within a building at the International Space Research Park?

- ☐ 1-5 years ☐ 6-10 years ☐ 11-15 ☐ More than 15 (Specify _____)

13. How many full-time employees do you estimate will be located at the potential Park facility at the time you begin operations?

_____ Employees

14. Please indicate which **TWO** of the following attributes are the most important to your organization's site selection? (Use numbers 1 and 2 to show order of importance.)

- ☐ Price of land lease/facility lease (for office or lab space)
☐ Terms and conditions of land lease (Specify _____)
☐ Easy accessibility (by land, sea, air—circle all that apply)
☐ Proximity to customers
☐ Proximity to Cape Canaveral Spaceport
☐ Scientific research and development environment
☐ Campus-style environment with abundant green space and natural water areas
☐ Access to a well-educated workforce

15. Besides those named above, what other attributes, if any, are very important to your organization's site selection? _____

16. Are there any "showstoppers" or negative factors that may influence your organization's decision to locate in the International Space Research Park?

17. What percent of your organization's revenue is expected to come from the following sources?

<u>Source</u>	<u>Percent</u>
University grants	_____

Local government _____
State government _____
Federal government _____
Sub-contracts (commercial) _____
Commercial sales of
Products/services _____

100% (*Check for total of 100%)

18. Which of the following ranges best describe the anticipated annual revenues that will be generated by the potential Park facility?

- ☐ Less than \$1 million (please approximate the amount \$_____)
- ☐ \$1-10 million
- ☐ \$11-20 million
- ☐ \$21-30 million
- ☐ \$31-40 million
- ☐ \$41-50 million
- ☐ More than \$50 million (please approximate the amount \$_____)

19. Is there anything else you would like to add to your response?

Those are all of the questions I have. Thank you for taking the time to respond. Your input will be extremely useful to the development plans for the International Space Research Park at Kennedy Space Center.

APPENDIX C: INTERVIEW FORM FOR CANDIDATE TENANTS UNFAMILIAR WITH THE ISRP

INTERVIEW QUESTIONS FOR POTENTIAL TENANTS OF THE INTERNATIONAL SPACE RESEARCH PARK

Company _____
Interviewee name _____ Title _____
Address _____
Phone number _____ Email _____
Date of interview _____ Interviewer _____

Hi, this is xxxxx at Futron Corporation in Bethesda, MD. We are working with the NASA Kennedy Space Center to determine the current level of interest in a proposed International Space Research Park and to assess the needs of potential tenants. We are conducting telephone interviews of organizations that have already expressed interest in operating a facility at the Research Park AS WELL AS organizations that we believe may have a future interest in the Research Park. Do you have a few minutes to answer some questions about your organization and your potential interest in the proposed Research Park?

Yes (Continue with questions below)

No (Is there a more convenient time that I could call you back? *Date Time*)

Change of contact (Who is a more appropriate person to talk to?)

Name

Phone number

SECTION 1

20. Have you heard of the International Space Research Park at the NASA Kennedy Space Center? If so, how did you hear about it? If not, would you be interested in learning more about it? If yes, go to end SECTION 2.

21. What is your organization's primary business? _____

22. Do you currently work for or in cooperation with NASA or the Cape Canaveral Air Force Station? ☐ Yes ☐ No

23. Does your organization have a current or future interest in or need to establish a presence near the Cape Canaveral Spaceport? ☐ Yes ☐ No **(If no, terminate interview.)**

If yes, please explain your organizations' activities that relate to the goals or activities of the Spaceport.

24. Which one of the following best describes the predominant business that your organization will perform at the potential Park facility?
- ☐ Research, development, and testing services
 - ☐ Engineering, architectural, and surveying services
 - ☐ Computer programming, data processing, and other computer-related services
 - ☐ Non-commercial research
 - ☐ College, university, professional or technical education
25. Which of the following do you anticipate that your organization would be interested in?
- ☐ Owning a building ☐ Leasing a building ☐ Leasing space within a building
26. What type of facility do you anticipate your organization would operate at the Park?
- ☐ Office ☐ Laboratory ☐ Office and Laboratory ☐ Other (specify _____)
27. Please estimate the number of square feet your organization would require for that type of space at a potential Park facility.
- _____ square feet office space _____ square feet lab space
28. When do you think your organization would begin operating a facility in the Park?
- ☐ 1-3 years ☐ 4-6 years ☐ 7-9 years ☐ 10-12 years ☐ 13-15 years ☐ 16-20 years
29. Is there anything else you would like to add to your response?

Those are all of the questions I have. Thank you for taking the time to respond. Your input will be extremely useful to the development plans for the International Space Research Park at Kennedy Space Center.

SECTION 2

NASA's Kennedy Space Center and the State of Florida's Spaceport Florida Authority are partnering to develop an International Space Research Park™ on 400 acres of land at the Kennedy Space Center. All Research Park tenants should have an interest in working towards the advancement of spaceport technologies and science. Tenants' work should include research and development, laboratory and technology support services, or space business development. Academic, government, and commercial tenants will have access to a 100,000 square-foot Space

Experiment Research and Processing Laboratory which will support International Space Station payloads and life sciences research.

If you would like additional information about the International Space Research Park or if your organization might be interested in establishing a facility at the Park, we will gladly send you some materials.

Appendix D: Regional Economic Impact Multipliers

All of the input-output (I-O) codes used in the RIMS II model are mapped to multiple standard industry classification (SIC) codes. For the estimated economic impacts of the ISRP, SIC codes 737, 871, 8731, 8734, and 822 were used for Park operations activity, and SIC codes 1623, 1611, 1542 were used for Park construction activity. The table shows all of the multipliers that were used to calculate the potential economic impacts of the ISRP, including the corresponding SIC and I-O codes that were used from the RIMS II model. The table shows the output, earnings, and jobs multipliers for the Florida, Central/Eastern Florida, and Brevard County regions for each I-O code.

Standard Industry Classification Codes		Corresponding Input-Output Codes for RIMS II MODEL		Florida Multipliers			Central/Eastern Florida Multipliers			Brevard County Multipliers		
SIC Code	Description	I-O Code	Description	Out-put	Earnings	Jobs	Out-put	Earnings	Jobs	Out-put	Earnings	Jobs
737	Computer programming, data processing, & other computer-related services	73.0104	Computer and data processing services	2.10	0.83	24.19	2.08	0.81	23.25	1.68	0.68	18.63
871	Engineering, architectural, & surveying services	73.0302	Engineering, architectural, and surveying services	2.20	0.86	30.44	2.10	0.81	28.40	1.65	0.64	22.07
8731/8734	Research, development, & testing services	73.0112	Testing and research labs	2.12	0.84	35.99	2.05	0.80	34.39	1.64	0.65	28.23
822	Colleges, universities, professional schools	77.0402	Colleges, universities, and professional schools	2.30	0.81	39.60	2.23	0.76	37.44	1.77	0.63	32.10
1623	Water, sewer, pipeline, and communications and power line (utilities infrastructure)	11.0400	New construction: highways and streets	2.23	0.69	25.54	2.03	0.60	22.26	1.61	0.49	18.06
1611	Highway and Street Construction, Except Elevated Highways (construction of roads, streets, alleys, public sidewalks, guardrails, parkways, and airports)	11.0400	New construction: highways and streets	2.23	0.69	25.54	2.03	0.60	22.26	1.61	0.49	18.06
1542	General Contractors-Nonresidential Buildings, Other than Industrial	11.0800	New construction: Office, industrial, and commercial buildings	2.10	0.68	26.15	1.98	0.61	23.61	1.60	0.50	19.46